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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 166)

APRIL 1977

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

STAR (N-10000 Series)	N77-13975—N77-15973
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NASA SP-7011 (166)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 166)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in March 1977 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 212 reports, articles and other documents announced during March 1977 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1977 Supplements.

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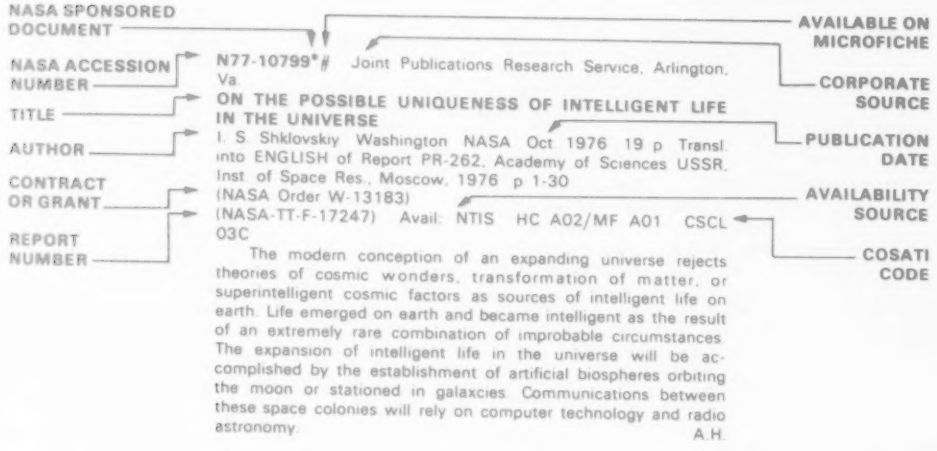
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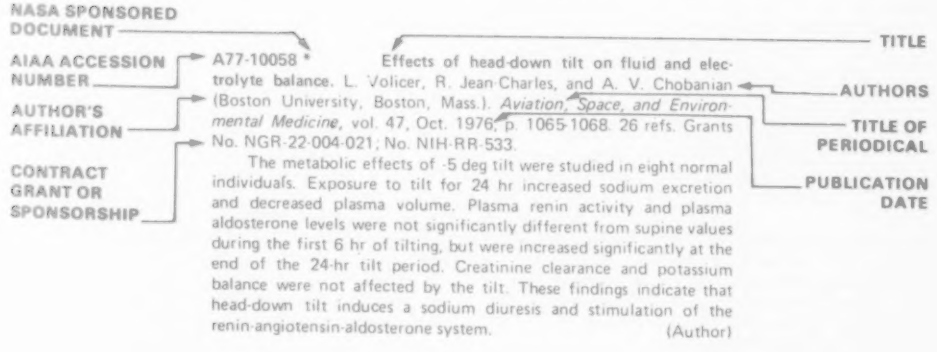
N77-10799*# Joint Publications Research Service, Arlington, Va.
ON THE POSSIBLE UNIQUENESS OF INTELLIGENT LIFE IN THE UNIVERSE
I. S. Shklovskiy Washington NASA Oct 1976 19 p Transl. into ENGLISH of Report PR-262, Academy of Sciences USSR, Inst. of Space Res., Moscow, 1976 p 1-30
(NASA Order W-13183)
(NASA-TT-F-17247) Avail: NTIS HC A02/MF A01 CSCL 03C
The modern conception of an expanding universe rejects theories of cosmic wonders, transformation of matter, or superintelligent cosmic factors as sources of intelligent life on earth. Life emerged on earth and became intelligent as the result of an extremely rare combination of improbable circumstances. The expansion of intelligent life in the universe will be accomplished by the establishment of artificial biospheres orbiting the moon or stationed in galaxies. Communications between these space colonies will rely on computer technology and radio astronomy.
A.H.

TYPICAL CITATION AND ABSTRACT FROM *IAA*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A77-10058 * Effects of head-down tilt on fluid and electrolyte balance. L. Volicer, R. Jean-Charles, and A. V. Chobanian (Boston University, Boston, Mass.). Aviation, Space, and Environmental Medicine, vol. 47, Oct. 1976, p. 1065-1068. 26 refs. Grants No. NGR-22-004-021; No. NIH-RR-533.
The metabolic effects of -5 deg tilt were studied in eight normal individuals. Exposure to tilt for 24 hr increased sodium excretion and decreased plasma volume. Plasma renin activity and plasma aldosterone levels were not significantly different from supine values during the first 6 hr of tilting, but were increased significantly at the end of the 24-hr tilt period. Creatinine clearance and potassium balance were not affected by the tilt. These findings indicate that head-down tilt induces a sodium diuresis and stimulation of the renin-angiotensin-aldosterone system.
(Author)

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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 166)

APRIL 1977

IAA ENTRIES

A77-16192 * **Solving the optimal attention allocation problem in manual control.** D. L. Kleinman (Connecticut, University, Storrs, Conn.). *IEEE Transactions on Automatic Control*, vol. AC-21, Dec. 1976, p. 813-822. 12 refs. Contract No. NAS1-13653.

Within the context of the optimal control model of human response, analytic expressions for the gradients of closed-loop performance metrics with respect to human operator attention allocation are derived. These derivatives serve as the basis for a gradient algorithm that determines the optimal attention that a human should allocate among several display indicators in a steady-state manual control task. Application of the human modeling techniques are made to study the hover control task for a CH-46 VTOL flight tested by NASA. (Author)

A77-16200 **The retina under neutron assault (La rétine sous le feu des neutrons).** M. Chabre. *La Recherche*, vol. 7, Dec. 1976, p. 1076-1079. 13 refs. In French.

Modest new progress in the study and analysis of the structure and functioning of the retinal chromoprotein rhodopsin through the application of neutron diffraction (in addition to X-ray diffraction studies) is reported. Information on localization of rhodopsin molecules in the retinal membrane, comparison of the ionophoric model and enzymatic model of rhodopsin activity, and some new evidence on the structure of the rhodopsin molecule are advanced through neutron diffraction studies of differentially deuterated materials and 'cryopickling' of specimens for electron micrography. A marked diamagnetic asymmetry of the retinal rods permitting perfect orientation in fields of several kG is judged similar to some liquid-crystal phenomena. R.D.V.

A77-16358 **Does prior knowledge facilitate the detection of visual targets in random noise.** J. S. Lappin (Vanderbilt University, Nashville, Tenn.) and W. R. Uttal (Michigan, University, Ann Arbor, Mich.). *Perception and Psychophysics*, vol. 20, no. 5, Nov. 1976, p. 367-374. 17 refs. NSF Grant No. BMS-75-19103; Grant No. NIH-MH-24016-03.

The central assumption in the autocorrelation theory of form detection is that detectability of a form depends entirely on its spatial structure relative to that of the random noise background, regardless of the observer's prior knowledge about the features of the form. The paper tested this assumption in a human experimental study where the observer's prior knowledge about the features of the target was manipulated by varying the size of the set of alternative target forms that were presented in a forced-choice detection task. The targets consisted of dots in a straight line, appearing in one of a specified set of 2, 4, or 8 alternative positions in a pattern of randomly distributed masking dots. The results do not indicate that prior knowledge about the position and orientation of a line facilitates detection of the line in random visual noise. The autocorrelation theory is thus confirmed in the sense that prior knowledge of the set of alternative targets has no effect on the visual process. However, this prior knowledge is found to affect only the decision process. S.D.

A77-16359 **Slant perception and binocular brightness differences - Some aftereffects of viewing apparent and objective surface slants.** J. T. Walker (Missouri, University, St. Louis, Mo.). *Perception and Psychophysics*, vol. 20, no. 5, Nov. 1976, p. 395-402. 20 refs.

A77-16394 # **Mathematical models for the growth, dynamics and diffusion of populations in biophysics, biochemistry and microbiology (Matematicheskie modeli rosta, dinamiki i diffuzii populiatsii v biofizike, biokhimii i mikrobiologii).** A. A. Berezovskii, Iu. R. Malashenko, E. V. Muchnik, and A. S. Fokht. In: Boundary value problems of the theory of heat conduction. Kiev, Institut Matematiki AN USSR, 1975, p. 173-226. 32 refs. In Russian.

A review is given of mathematical models describing the growth and dynamics of populations (people, animals, plants, and microorganisms). Attention is given to simple equations of population growth, spatially inhomogeneous populations, the interaction of competing populations competition within a species, and Volterra's model which takes account of heredity. Models for the growth kinetics of microorganisms are also considered. B.J.

A77-16400 # **Adaptation of the heart to increased load and cardiac insufficiency (Adaptatsiia serdtsa k bol'shoi nagruzke i serdechnaia nedostatochnost').** F. Z. Meerson. Moscow, Izdatel'stvo Nauka, 1975. 264 p. 380 refs. In Russian.

The work is concerned with short-term (immediate) and long-term adaptation of the heart to increased load, with special emphasis on the compensatory hypertrophy of the heart. Functional disorders of the enlarged myocardium are discussed along with relevant cardiac insufficiency. Data are presented on the role of calcium transport and activation of the synthesis of nucleic acids and proteins in the mobilization of cardiac reserves during adaptation to increased loads. The results are used to shed light on the mechanism governing the development of cardiac insufficiency of the enlarged myocardium in man. S.D.

A77-16527 # **The effect of increased acceleration on the vibratory behavior of a sitting subject (Der Einfluss erhöhter Beschleunigung auf das Schwingungsverhalten des sitzenden Menschen).** H. Mertens (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Jahrestagung, 9th, Munich, West Germany, Sept. 14-16, 1976, Paper 76-212*. 20 p. 5 refs. In German.

Experimental test facilities and experimental procedures for running tests on the responses of human subjects (6 men, 3 women) to static and dynamic vibrations and accelerations are described. Subjects were tested in upright sitting position on a cantilevered

beam in a centrifuge facility. The mechanical impedance of the body (head and seat) and the transfer response for mechanical vibrations between sitting plane and head were measured. A spring-mass-dashpot representation of the human body is presented. No significant differences in the responses of male and female subjects were recorded. Accelerations ran to 4 G, vibrations to 20 Hz, in the tests, and nhase measurements were recorded and reported. R.D.V.

A77-16548 **Quantitative determination of the control capacity of air traffic control working areas as a human engineering problem (Die quantitative Bestimmung der Kontrollkapazität von Flugsicherungskontrollarbeitsplätzen als anthropotechnische Aufgabenstellung).** K. Brauser (Messerschmitt-Bölkow-Blohm GmbH, Ottobrunn, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Jahrestagung, 9th, Munich, West Germany, Sept. 14-16, 1976, Paper 76-161*. 29 p. 10 refs. In German. (MBB-UFE-1267)

The relationship between quantitative measurements and calculation of the control capacity of air traffic work positions with the layout of the air traffic control work area is examined. Methods of measuring control burden and capacity are reviewed. P.T.H.

A77-16580 # **Human factors in man-machine systems (Humanfaktoren in Mensch-Maschine-Systemen).** K. Steininger (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Hamburg, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Jahrestagung, 9th, Munich, West Germany, Sept. 14-16, 1976, Paper 76-160*. 13 p. 12 refs. In German.

The role of human error as a vital factor in the occurrence of fatal accidents is considered. It is pointed out that a classification of faulty human behavior as human error in an evaluation of the causes of the accident is not sufficient. A description should be given of those details of human behavior which are responsible for the accident, taking into account also the causes for the observed human reaction or nonreaction. Approaches for considering the various factors which affect the operation of the man-machine system are discussed and attention is given to the development of suitable man-machine systems in which the characteristics of the human element are fully taken into account. G.R.

A77-16658 * **Analog enhancement of radiographic images.** N. A. Baily and R. J. Nachazel (California, University, La Jolla, Calif.). In: Biomedical Symposium, San Diego, Calif., February 4-6, 1976, Proceedings. Volume 15. New York, Academic Press, Inc., 1976, p. 159-166. 5 refs. Grant No. NGR-05-009-257.

The paper shows how analog methods for edge sharpening, contrast enhancement, and expansion of the range of gray levels of particular interest are effective for easy on-line application to video viewing of X-ray roentgenograms or to fluoroscopy. The technique for analog enhancement of radiographic images is a modified version of the system designed by Fuchs et al. (1972), whereby an all directional second derivative signal called detail signal is used to produce both vertical and horizontal enhancement of the image. Particular attention is given to noise filtration and contrast enhancement. Numerous radiographs supplement the text. S.D.

A77-16660 * **Functional colloidal particles for immunoresearch.** S. P. S. Yen, A. Rembaum (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), R. W. Molday, and W. Dreyer (California Institute of Technology, Pasadena, Calif.). In: Emulsion polymerization. Washington, D.C., American Chemical Society (ACS Symposium Series, No. 24), 1976, p. 236-257. 29 refs. Contract No. NAS7-100.

The paper deals with the development of a new class of immunological reagents consisting of antibodies covalently bonded to polymeric microspheres to serve as convenient markers for detection of cell surface antigens by scanning electron and light microscopy. Attention is focused on the design and synthesis of spherical particles containing hydroxyl and carboxyl groups on their surface in a wide range of sizes (30-340 nm diam) by emulsion copolymerization, the preparation of spherical particles ranging from 300 nm to 3 microns and containing a variety of functional groups by means of ionizing radiation, and the experimental conditions for the covalent bonding of fluorescent molecules and antibodies to the spheres by means of the cyanogen bromide, carbodiimide and glutaraldehyde methods. These reagents are used to locate antigens on red blood cells, on mouse and human lymphocytes, and on the surface of photoreceptors. They offer a number of advantages and applications for the study of cell surfaces for immunodiagnosis. S.D.

A77-16662 * **Effects of temperature on the life span, vitality and fine structure of Drosophila melanogaster.** J. Miquel, P. R. Lundgren, K. G. Bensch, and H. Atlan (NASA, Ames Research Center, Moffett Field; Stanford University, Stanford, Calif.). *Mechanisms of Ageing and Development*, vol. 5, 1976, p. 347-370. 31 refs. Research supported by the Institut National de la Santé et de la Recherche Médicale and Foundations Claude Pompidou and Philippe.

A77-16663 * **Limitation on the use of the horizontal clinostat as a gravity compensator.** A. H. Brown, A. O. Dahl, and D. K. Chapman (University City Science Center; Pennsylvania, University, Philadelphia, Pa.). *Plant Physiology*, vol. 58, 1976, p. 127-130. 24 refs. Grants No. NGR-39-010-104; No. NGR-39-010-149; No. NGR-39-030-010; Contracts No. NAS2-2432, No. NAS2-7730; No. NASw-2208; No. NASw-2232.

If the horizontal clinostat effectively compensates for the influence of the gravity vector on the rotating plant, it should make the plant unresponsive to whatever chronic acceleration may be applied transverse to the axis of clinostat rotation. This was tested by centrifuging plants while they were growing on clinostats. For a number of morphological endpoints of development the results depended on the magnitude of the applied g-force. Therefore, gravity compensation by the clinostat was incomplete. This conclusion is in agreement with results of satellite experiments which are reviewed. (Author)

A77-16664 * **Morphology of Arabidopsis grown under chronic centrifugation and on the clinostat.** A. H. Brown, A. O. Dahl, and D. K. Chapman (University City Science Center; Pennsylvania, University, Philadelphia, Pa.). *Plant Physiology*, vol. 57, 1976, p. 358-364. 17 refs. Grants No. NGR-39-010-104; No. NGR-39-010-149; No. NGR-39-030-010; Contracts No. NAS2-2432, No. NAS2-7730; No. NASw-2208; No. NASw-2232.

Morphological measurements were made on populations of Arabidopsis thaliana grown from seed for 21 days under essentially constant environmental conditions except for the influence of gravitational or centrifugal accelerations. Growth conditions were what had been proposed for experiments in an artificial satellite. Observations are reported for plants grown at normal 1-g upright or on horizontal clinostats and for plants grown on a centrifuge. Increased g-force, up to 15 times normal, was found to have significant but small effects on some morphological end points. The plants' sensitivity to the magnitude of the g-force was much less than to its vector direction. Data from centrifuge experiments were extrapolated to zero-g to predict a set of morphological characteristics of a plant developing in the satellite environment. As an alternative means of predicting properties of a zero-g plant, characteristics of plants grown on horizontal clinostats were measured. The results of these two predictive methods were not in agreement. Clinostat grown plants were morphologically distinct from upright stationary controls. (Author)

A77-16667 * **A computer program for the localization of small areas in roentgenological images.** R. A. Keller and N. A. Baily (California, University, La Jolla, Calif.). *Investigative Radiology*, vol. 11, Mar.-Apr. 1976, p. 125-133. 14 refs. Grant No. NGR-05-009-257.

A method and associated algorithm are presented which allow a simple and accurate determination to be made of the location of small symmetric areas presented in roentgenological images. The method utilizes an operator to visually spot object positions but eliminates the need for critical positioning accuracy on the operator's part. The rapidity of measurement allows results to be evaluated on-line. Parameters associated with the algorithm have been analyzed, and methods to facilitate an optimum choice for any particular experimental setup are presented. (Author)

A77-16668 * **The response of fluoroscopic image intensifier-TV systems.** N. A. Baily and R. A. Keller (California, University, La Jolla, Calif.). *Investigative Radiology*, vol. 11, July-Aug. 1976, p. 335-337. 8 refs. Grants No. NGR-05-009-257; No. PHS-1-P17-HL-14169.

Three different types of X-ray fluoroscopic TV chains were investigated: two standard clinical units, one with a vidicon camera tube, the other with a plumbicon camera tube; and the third was a large flat-screen unit. In each an X-ray beam generated at 100 kVp was passed through 10 cm of H_2O before aluminum absorbers of varying thickness were introduced. Five video recordings were made at each absorber thickness. The video image was digitized directly from the disk recording and quantized into 128 gray levels. The five recordings were averaged on a point-to-point basis, and the central 900 averaged points were again averaged to yield a value for the gray level assigned to each particular image. This 30 by 30 matrix of points corresponds to input screen areas of 29, 8.2, and 3.6 sq cm for the three units investigated. B.J.

A77-16672 * **Isolation and identification of the conidial germination factor of Neurospora crassa.** N. H. Horowitz, G. Charlang, G. Horn, and N. P. Williams (California, Institute of Technology, Pasadena, Calif.). *Journal of Bacteriology*, vol. 127, July 1976, p. 135-140. 23 refs. Grant No. NGR-05-002-121.

The germination-essential substance (germination factor /GF/) that is lost from conidia of Neurospora crassa on exposure to solutions of low water activity has been isolated and identified as a group of iron-transport compounds, or siderochromes. The principal siderochrome of conidia is ferricrocin, a cyclic hexapeptide. A closely related substance, ferrichrome C, is tentatively identified as a minor constituent. The same substances are also present in extracts of mycelium along with small amounts of a third siderochrome, which has not been identified. The GF activity of culture filtrates is due to coprogen, the only siderochrome previously identified with N. crassa. (Author)

A77-16674 * **Existence of electrogenic hydrogen ion/sodium ion antiport in Halobacterium halobium cell envelope vesicles.** J. K. Lanyi and R. E. MacDonald (NASA, Ames Research Center, Biological Adaptation Branch, Moffet Field, Calif.). *Biochemistry*, vol. 15, no. 21, 1976, p. 4608-4614. 28 refs.

A77-16725 # **The control of the conjugated horizontal eye movements - Investigations concerning the saccadic system and the fixation system of the human oculomotor (Die Regelung der konjugierten horizontalen Augenbewegungen - Untersuchungen am sakkadischen System und am Fixationssystem der menschlichen Okulomotorik).** W. Becker. München, Technische Universität, Fachbereich Elektrotechnik, Dr.-Ing. Dissertation, 1975. 19 p. 13 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft.

A study is conducted of the approaches used in the stabilization of the eye during the fixation of a target point. The accuracy of saccadic eye movements is considered, taking into account a quantitative experimental study with a number of subjects. The reaction of the saccadic system in response to two sudden motions of the target point in rapid succession is also explored, giving attention to the modification of saccade amplitude by the second motion, the interval-distance function, and the representation of the reactions by a model. G.R.

A77-16745 # **The influence of mild hypoxia on the vestibular system (Der Einfluss milder Hypoxie auf das Vestibularsystem).** H.-J. Schöder (Medizinischer Dienst des Verkehrswesens der DDR, Berlin, East Germany). *Technisch-ökonomische Information der zivilen Luftfahrt*, vol. 12, no. 4, 1976, p. 231-234. 20 refs. In German.

Hypoxemia occurring in connection with the reduced partial oxygen pressure existing under flight conditions can affect the central regulation centers of the pilot's brain. The organism can alleviate the effects of hypoxia with the aid of hyperventilation and other means. However, a complete elimination of the effect of hypoxia is not possible. The results of investigations involving pilots in good physical conditions are discussed. Discrete functional vestibular disturbances can be recognized in connection with hypoxic hypoxemia. G.R.

A77-16750 **Eye motion during whole-body vertical vibration.** M. J. Griffin (Southampton, University, Southampton, England). *Human Factors*, vol. 18, Dec. 1976, p. 601-606. 8 refs.

Whole-body vertical sinusoidal vibration was produced by an electrodynamic vibrator in six male subjects aged 26-31 yr seated on a flat horizontal wooden surface without harness at vibration frequencies of 7, 15, 30, and 60 Hz. The objective was to determine whether eye motion is linear or angular by comparing the levels of whole-body vibration required to produce a visual blur at viewing distances of 1.2 and 6.0 m. It is found that for whole-body vibration at frequencies above 7 Hz, the minimum levels of vibration likely to produce decrements in visual acuity cause an eye motion which is predominantly angular. The levels of vibration which produce a visual blur of the image of objects located at distances greater than about 1 m are independent of viewing distance. There is evidence that the eye compensates for angular vibration of the head at a frequency of 7 Hz. S.D.

A77-16776 **Interaction between local and reflex influences on human forearm skin blood flow.** J. M. Johnson, G. L. Brengelmann, and L. B. Rowell (Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 826-831. 20 refs. Grants No. NIH-HL-16910; No. NIH-RR-37.

Experiments were conducted on 15 healthy men aged 23-40 yr to determine whether a high local skin temperature (Tsk) modifies the cutaneous vascular response to increased vasodilator flow and whether a high local Tsk can abolish or significantly diminish the ability of the skin to respond to increased vasoconstrictor outflow. The approach was to measure forearm blood flow to each arm maintained at different temperatures. Vasodilator outflow to skin was increased by whole body direct heating with water perfused suits, while vasiconstrictor outflow to skin was increased by lower body negative pressure which simulates a mild hemorrhage by pooling blood in the leg veins. Forearm blood flow is measured by venous occlusion plethysmography. It is shown that local and reflex influences to skin interact so as to modify the degree but not the pattern of skin vasomotor response, where temperature at the site of skin blood flow measurement is an important factor. S.D.

A77-16777 **Alterations in the coronary circulation of man following ascent to 3,100 m altitude.** R. F. Grover, R. Lufschanowski, and J. K. Alexander (University of Colorado Medical Center, Denver, Colo.; Baylor University, Houston, Tex.). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 832-838. 27 refs. Grant No. NIH-HL-14985.

Alterations in coronary blood flow associated with adaptation to high altitude were examined. Three normal men native to low altitude were studied, first at sea level, and again after a 10-day stay at 3,100 m altitude. During rest at high altitude, a 32% decrease in coronary blood flow was largely offset by a 28% increase in coronary arterial O2 extraction to maintain myocardial O2 delivery. The increase in O2 extraction resulted mainly from a decrease in coronary sinus blood O2 content and saturation. However, coronary sinus O2 tension remained constant, implying a decrease in the affinity of hemoglobin for O2. These observations are consistent with the hypothesis that coronary blood flow is regulated to maintain constant myocardial tissue O2 tension. The absence of a decrease in coronary sinus O2 tension or a decrease in myocardial lactate extraction imply that myocardial hypoxia did not develop. Therefore, myocardial hypoxia is not the basis for the decrease in stroke volume at high altitude reported previously and also observed in the present study. (Author)

A77-16778 **Ventilation in conscious dogs during acute and chronic hypercapnia.** D. B. Jennings and C. C. Chen (Queen's University, Kingston, Ontario, Canada). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 839-847. 41 refs. Research supported by the Ontario Heart Foundation and Defence Research Board of Canada.

A77-16779 **Effect of altitude exposure on thermoregulatory response of man to cold.** C. M. Blatteis and L. O. Lutherer (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 848-858. 58 refs. Grant No. DADA17-68-C-8136.

The paper investigates the thermoregulatory response to cold (at 10 C for 3 hr) of 12 lowlanders and 2 groups of 5 highlanders exposed acutely to various altitudes above 3300 m, along with the effect of a six-week stay of the lowlanders at altitude on their thermoregulatory response. Three observations are of particular interest: (1) cold-induced increases in the oxygen consumption rate of both lowlanders and highlanders are reduced at altitude as compared to those at sea level; (2) shivering intensity of the lowlanders is not diminished at altitude as compared to that at sea level despite the observed decrease in their oxygen consumption rate at altitude, while that of the highlanders is lower at sea level than at latitude despite their higher oxygen consumption rate at sea level; and (3) altitude-induced reduction of the oxygen consumption rate response to cold of the lowlanders is not reversed during their six-week stay at altitude. It is concluded that altitude exposure reduces the calorigenic response of man to cold and that this effect is not reversed by altitude acclimatization, yet is reversible immediately upon descent to sea level. S.D.

A77-16780 **Ventilatory control in peripheral chemoreceptor-denervated ponies during chronic hypoxemia.** H. V. Forster, G. E. Bisgard, B. Rasmussen, J. A. Orr, D. D. Buss, and M. Manohar (Wisconsin, University, Madison; Wisconsin, Medical College, Milwaukee, Wis.). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 878-885. 29 refs. Research supported by the University of Wisconsin; Grant No. PHS-HL-15473.

Experiments were conducted on normal and chemoreceptor-denervated (CD) ponies under sea-level conditions and during a four-day stay under hypobaric hypoxia conditions to provide further insight into the role of aortic and carotic chemoreceptors in ventilatory (minute ventilation) acclimatization. Major findings are that ventilation increased in both groups between the 2nd and 8th hour of hypoxia, that this change persisted throughout the four-day hypoxia in the normal ponies, and that in the CD ponies this change is evident consistently only through the 12th hour and after the 44th hour hyperventilation is no longer observed. It is concluded that the peripheral chemoreceptors are essential in ponies for normal ventilatory acclimatization to the degree of hypoxemia considered. Additional findings are presented suggesting the presence of a CNS inhibitory influence on the ventilatory control center during chronic hypoxemia. S.D.

A77-16781 * **Cardiorespiratory deconditioning with static and dynamic leg exercise during bed rest.** R. W. Stremel, V. A. Convertino, E. M. Bernauer, and J. E. Greenleaf (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, Calif; California, University, Davis, Calif.). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 905-909. 31 refs. Grant No. NCA2-OR180-506.

Results are presented for an experimental study designed to compare the effects of heavy static and dynamic exercise training during 14 days of bed rest on the cardiorespiratory responses to submaximal and maximal exercise performed by seven healthy men aged 19-22 yr. The parameters measured were submaximal and maximal oxygen uptake, minute ventilation, heart rate, and plasma volume. The results indicate that exercise alone during bed rest reduces but does not eliminate the reduction in maximal oxygen uptake. An additional positive hydrostatic effect is therefore necessary to restore maximal oxygen uptake to ambulatory control levels. The greater protective effect of static exercise on maximal oxygen uptake is probably due to a greater hydrostatic component from the isometric muscular contraction. Neither the static nor the dynamic exercise training regimes are found to minimize the changes in all the variables studied, thereby suggesting a combination of static and dynamic exercises. S.D.

A77-16782 **Left ventricular effects on right ventricular developed pressure.** W. P. Santamore, P. R. Lynch, J. L. Heckman, A. A. Bove, and G. D. Meier (Temple University, Philadelphia, Pa.). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 925-930. 25 refs. Grant No. NIH-HL-08886-11.

Isolated, flow-perfused, paced rabbit hearts beating isovolumically were examined to determine the effect of the left ventricle (LV) on the right ventricle transmitted through the myocardium, independent of neural, humoral, pericardial, and pulmonary circulatory influence. For this purpose, the effects of changing LV volume and altering the structural integrity of the left ventricle on right ventricular isovolumic pressure were assessed, the effect of occluding the left coronary artery on right ventricular performance was recorded, and the changes in right ventricular configuration that occurred due to volume alteration or left coronary occlusion were analyzed by cineradiography. It is shown that alteration in LV free wall function and changes in LV volume can directly affect right ventricular isovolumic developed pressure through the myocardium. S.D.

A77-16783 **Computer simulation of brainstem respiratory activity.** S. Geman and M. Miller (Dartmouth College, Hanover, N.H.). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 931-938. 39 refs. Grant No. PHS-HL-02888-17.

The paper discusses the development of a mathematical model of respiratory periodicity based on available neurophysiological data and examines the dynamic characteristics and implications of such a model by computer simulation. The ability of the model to mimic certain aspects of physiological experiment supports the notion of a basic medullary respiratory oscillator. The model consists only of inspiratory and expiratory populations with excitatory and inhibitory synaptic influences within each population, without incorporating specialized components or assuming specialized functions. In the model presented, vagal discharge inhibits inspiratory

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elements, whereas in the absence of simulated vagal discharge, facilitation of synaptic weights produces an increase in amplitude of inspiratory and expiratory activity while having little effect on frequency. By allowing for random generation of individual connections, only a small number of parameters are required to determine the characteristics of the resulting rhythm. S.D.

A77-16784 **Ventricular dimensions measured noninvasively by echocardiography in the awake dog.** I. Mashiro, R. R. Nelson, J. N. Cohn, and J. A. Franciosa (Minnesota, University; U.S. Veterans Administration Hospital, Minneapolis, Minn.). *Journal of Applied Physiology*, vol. 41, Dec. 1976, p. 953-959. 26 refs.

A77-17079 **The perception of moving targets.** R. Sekuler (Northwestern University, Evanston, Ill.) and E. Levinson. *Scientific American*, vol. 236, Jan. 1977, p. 60-64, 70-73.

Specialized sensory and nervous subsystems that sort out information on the direction of a perceived object from information on the shape of the object are discussed. Contrast thresholds for moving objects and perception of a moving object at lower sensory thresholds (close to vanishing), selective adaptation and adapting stimuli, aftereffects and illusions associated with perception of moving objects, combination stimuli, decomposition and synthesis of sets of stimuli representing objects in motion, and testing of subjects with phase-alternating (counterphase) gratings are discussed. Aberrations in experimental animals subjected to relevant brain damage, or to humans suffering scotoma, and their defective responses to motion-direction stimuli are covered. Tests of direction-specific adaptation are described. R.D.V.

A77-17300 * **A role for glucose in hypothermic hamsters.** G. E. Resch and X. J. Musacchia (Missouri-Columbia, University, Columbia, Mo.). *American Journal of Physiology*, vol. 231, Dec. 1976, p. 1729-1734. 22 refs. Grant No. NGL-26-004-021.

Hypothermic hamsters at a rectal temperature of 7 C showed a fivefold increase in survival times from 20 to 100.5 hr when infused with glucose which maintained a blood level at about 45 mg/100 ml. A potential role for osmotic effects of the infusion was tested and eliminated. There was no improvement in survival of 3-O-methylglucose or dextran 40-infused animals. The fact that death eventually occurs even in the glucose-infused animal after about 4 days and that oxygen consumption undergoes a slow decrement in that period suggests that hypothermic survival is not wholly substrate limited. Radioactive tracer showed that localization of the C-14 was greatest in brain tissue and diaphragm, intermediate in heart and kidney, and lowest in skeletal muscle and liver. The significance of the label at sites important to respiration and circulation was presented. (Author)

A77-17351 * **Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford University, Stanford, Calif., July 10-12, 1975.** Conference sponsored by Stanford University and NASA. Edited by D. C. Harrison (Stanford University, Stanford, Calif.), H. Sandler (NASA, Ames Research Center, Moffett Field, Calif.), and H. A. Miller (Stanford University, Stanford, Calif.). Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers (SPIE Proceedings. Volume 72), 1975. 373 p. $26.

The present collection of papers outlines advances in ultrasonography, scintigraphy, and commercialization of medical technology as applied to cardiovascular diagnosis in research and clinical practice. Particular attention is given to instrumentation, image processing and display. As necessary concomitants to mathematical analysis, recently improved magnetic recording methods using tape or disks and high-speed computers of large capacity are coming into use. Major topics include Doppler ultrasonic techniques, high-speed cineradiography, three-dimensional imaging of the myocardium with isotopes, sector-scanning echocardiography, and commercialization of the echocardioscope. S.D.

A77-17352 **Developmental highlights and present applications of cardiac ultrasound.** R. L. Popp (Stanford University, Stanford, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 3-8.

Following a brief overview of the development of ultrasonics and its application to clinical cardiac assessment, the paper presents a review of current applications of ultrasound for cardiac imaging. Attention is focused on the echocardiographic A-mode or amplitude-modulated display and B-mode or brightness-modulated display, with conventional echocardiography based on the time-motion display. The principles of operation and clinical uses of both methods of ultrasonic display are outlined. Recent applications include echocardiographic analysis of the dynamics of cardiac contraction and ventricular ejection, along with a study of the effect of lower-body negative pressure on the dynamics of contraction and left ventricular volume. Ingenious instrumentation is needed to see all the areas of the heart both in coronary artery disease and in other conditions which are difficult to diagnose using a single transducer beam. S.D.

A77-17353 **Sector-scanning echocardiography.** W. L. Henry and J. M. Griffith (National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 25-29. 9 refs.

The paper describes the design and capabilities of a mechanical sector-scanner with a large-diameter transducer of greater sensitivity and resolution for noninvasive echocardiographic assessment of the heart with two-dimensional images generated in real time. The operator is able to watch the video signal and simultaneously adjust the scanner position until the clearest heart section to be viewed is displayed. The device consists of a hand-held scanner, a video display, and a video recorder. The hand-held scanner is composed of a 1.2 cm diam ultrasound transducer, an angle indicator, and a small feedback-regulated dc motor. The transducer is rapidly angled through a 30-deg sector at a rate of 15 cycles/sec by a small dc motor connected to the transducer via a crank-lever system. In order to record the sector images, a closed-circuit TV camera is focused on the video display and its output is recorded on video tape. The device is particularly useful in quantitating the severity of mitral stenosis by measurement of mitral valve orifice area and in diagnosing subjects with cyanotic congenital heart disease. S.D.

A77-17354 **Potential of real-time orthographic ultrasonic imaging for cardiovascular diagnosis.** P. S. Green and K. W. Marich (Stanford Research Institute, Menlo Park, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 31-35. 5 refs. Grant No. NIH-GM-18780.

The capabilities of an ultrasonic clinical camera with a resolution of 1.3 mm for a depth of focus of 1 cm are described for the real-time orthographic transmission imaging of the cardiovascular system. Results are presented for in vitro and in vivo transmission imaging studies on a wide selection of tissues and organs to reveal the potential feasibility of using this technique for cardiovascular applications. The results suggest that real-time orthographic transmission imaging should provide clinically significant information

about disorders of the superficial vascular system. Its eventual usefulness for visualizing deeper vessels and the heart is presently difficult to assess. The reflection mode approach holds more promise for imaging the heart, but awaits further improvement of the system. S.D.

A77-17355 **Computer processing of echocardiographic images.** W. J. Sanders and D. C. Harrison (Stanford University, Stanford, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 37-43. 7 refs.

The paper discusses the techniques used in analyzing echocardiograms, illustrates the complexity of the problems involved, and describes how these problems may be solved. Particular attention is given to the equipment and methods of recording the ultrasonic echoes, conversion of the echo signal to computer-readable form, storage of the data by the computer, and data manipulation. Once the digitized echo data have been input to the computer, digital image processing techniques may be used to process the data. A table is presented which summarizes some of the problems, progress to date, and possible areas of future work on chronic monitoring of stroke volume. S.D.

A77-17356 **Doppler instrumentation for measuring blood velocity and flow.** R. W. Gill (Ultrasonics Institute, Sydney, Australia), C. F. Hottinger, and J. D. Meindl (Stanford University, Stanford, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 53-63. 52 refs.

The basic principles of the Doppler technique for accurate measurement of blood velocity are described, with particular reference to continuous-wave flowmeter, pulsed flowmeter, and random signal flowmeter. System design is discussed in terms of ultrasonic frequency, transducer size, transducer angle, burst repetition rate, burst length and random signal bandwidth. As long as the usually accepted safety limits are not exceeded, the ultrasonic transmit power is simply increased until the Doppler SNR is adequate. Receiver characteristics are examined along with Doppler signal processing. A number of applications of the three types of Doppler flowmeters are presented to illustrate both typical configurations and representative applications of these systems. It is concluded that Doppler ultrasonic blood flowmeters are useful in many areas of medicine, both in research and in clinical practice. S.D.

A77-17357 **Applications of Doppler ultrasound in clinical vascular disease.** R. W. Barnes (Iowa, University; U.S. Veterans Administration Hospital, Iowa City, Iowa), D. E. Hokanson, D. S. Sumner, and D. E. Strandness, Jr. (U.S. Veterans Administration Hospital, Seattle, Wash.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 65-72. 28 refs.

Current and anticipated applications of Doppler ultrasound in venous, peripheral artherial, and cerebrovascular diseases are examined with particular reference to the capabilities of continuous-wave and pulsed Doppler ultrasound detection techniques. Diagnostic studies are discussed in terms of deep vein thrombosis, superficial thrombophlebitis, postphlebitic syndrome, varicose veins, pulmonary embolism, and cardiac disease. Recent development of pulsed Doppler ultrasound provides unique longitudinal and transverse cross-sectional images of the arterial lumen with a resolution approaching that of conventional X-ray techniques. S.D.

A77-17358 **Processing and display techniques for Doppler flow signals.** J. M. Reid (Institute of Applied Physiology and Medicine, Seattle, Wash.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 73-78. 22 refs.

The objective of the various processing and display techniques are to derive from the ultrasonic Doppler spectrum a meaningful measure of the flow phenomenon under study and to present this measure to the operator. A number of techniques are described which allow the designer to implement the form of processing and display which is suitable in most applications. The choice of techniques is affected by the necessity to remove the effects of disrupting influences or operating deficiencies of the basic Doppler instrument. The discussion covers the characteristics of Doppler spectrum analysis, use of frequency meters based on the zero-crossing principle, an analog circuit for calculating the true mean or first-moment of the spectrum, and display of geometry as related to the presentation of anatomical relationships. Further work in the field of processing and display of Doppler information is proceeding in the direction of evaluation of volume flow transcutaneously. S.D.

A77-17359 * **Quantitative three-dimensional dynamic imaging of structure and function of the cardiopulmonary and circulatory systems in all regions of the body.** R. E. Sturm, E. L. Ritman, and E. H. Wood (Mayo Foundation, Dept. of Physiology and Biophysics, Rochester, Minn.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 103-122. 14 refs. Grants No. NIH-HL-04664; No. NIH-RR-7; No. NGR-24-003-001; Contract No. F44620-71-C-0069.

A77-17360 * **Regional myocardial shape and dimensions of the working isolated canine left ventricle.** E. Ritman, K. Tsuiki, D. Donald, and E. H. Wood (Mayo Foundation, Dept. of Physiology and Biophysics, Rochester, Minn.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 129-137. 16 refs. Research supported by the American Heart Association; Grants No. NIH-HL-04664; No. NIH-RR-7; No. NGR-24-003-001.

Angiographic experiments were performed on isolated canine left ventricle preparations using donor dog to supply blood to the coronary circulation via a rotary pump to control coronary flow. The angiographic record was transferred from video tape to video disk for detailed uninterrupted sequential analysis at a frequency of 60 fields/sec. It is shown that the use of a biplane X-ray technique and a metabolically supported isolated canine left ventricle preparation provides an angiographically ideal means of measuring the mechanical dynamics of the myocardium while the intact left ventricular myocardial structure and electrical activation pattern retain most of the in situ ventricular characteristics. In particular, biplane X-ray angiography of the left ventricle can provide estimates of total ventricular function such as ejection fraction, stroke volume, and myocardial mass correct to within 15% under the angiographically ideal conditions of the preparation. S.D.

A77-17361 * **Real-time detection and data acquisition system for the left ventricular outline.** J. H. C. Reiber (NASA, Ames Research Center, Moffett Field, Calif.; Rotterdam, Erasmus Universiteit, Rotterdam, Netherlands; Stanford University, Stanford, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 139-147. 12 refs.

The paper describes the design and capabilities of a computer-interfaced angiocardiographic automated border recognizer for real-time detection and data acquisition regarding the left ventricular outline. The contour detection is based on a thresholding technique that uses an analog comparator to compare the video signal with a constant reference level, which can be used satisfactorily only if the brightness level is roughly constant along a ventricular border. The use of dynamic reference level is described for achieving a marked improvement by having the reference level dynamically adjusted according to local brightness levels on a line-to-line basis. Also discussed are the features of the computer interface designed and implemented for the real-time on-line storage of the obtained border coordinates. Results to date indicate that the system provides an accurate left ventricular contour even in pictures with relatively low contrast. Application of the threshold detection technique to echocardiography is briefly discussed. S.D.

A77-17362 * **Digital image processing of vascular angiograms.** R. H. Selzer, E. S. Beckenbach (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), D. H. Blankenhorn, D. W. Crawford, and S. H. Brooks (Southern California, University, Los Angeles, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 159-162.

The paper discusses the estimation of the degree of atherosclerosis in the human femoral artery through the use of a digital image processing system for vascular angiograms. The film digitizer uses an electronic image dissector camera to scan the angiogram and convert the recorded optical density information into a numerical format. Another processing step involves locating the vessel edges from the digital image. The computer has been programmed to estimate vessel abnormality through a series of measurements, some derived primarily from the vessel edge information and others from optical density variations within the lumen shadow. These measurements are combined into an atherosclerosis index, which is found in a post-mortem study to correlate well with both visual and chemical estimates of atherosclerotic disease. S.D.

A77-17363 * **Three-dimensional reconstruction and display of the heart, lungs and circulation by multiplanar X-ray scanning videodensitometry.** R. Robb, E. Ritman, and E. H. Wood (Mayo Foundation, Dept. of Physiology and Biophysics, Rochester, Minn.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 183-194. 32 refs. Research supported by the American Heart Association; Grants No. NIH-HL-04664; No. NIH-RR-7; No. NIH-HL-02341; No. NGR-24-003-001; Contract No. F44620-71-C-0069.

A77-17364 **Clinical applications of a quantitative analysis of regional left ventricular wall motion.** R. F. Leighton, J. M. Rich, M. E. Pollack, and P. I. Altieri (Ohio, Medical College, Toledo, Ohio). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 203-208. 13 refs.

Results are presented from a quantitative analysis of ventricular wall motion primarily directed to detection of both hypokinesis and akinesis in left ventricular cineangiograms. The method is based on statistical comparisons with normal values for regional wall motion derived from the cineangiograms of patients who were found not to have heart disease. It is shown that a quantitative method for analyzing wall motion appears to be essential for proper interpretation and display of subtle abnormalities in the amplitude and rate of left ventricular contraction. Otherwise these relatively common abnormalities in wall motion may either be misinterpreted or may go undetected. At present the detection of these abnormalities has been most useful when applied to patients with coronary heart disease. S.D.

A77-17365 * **Clinical application of a light-pen computer system for quantitative angiography.** E. L. Alderman (Stanford University, Stanford, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 209-216. 9 refs. Grants No. NGL-05-020-305; No. NIH-1-PO1-HL-15833.

The paper describes an angiographic analysis system which uses a video disk for recording and playback, a light-pen for data input, minicomputer processing, and an electrostatic printer/plotter for hardcopy output. The method is applied to quantitative analysis of ventricular volumes, sequential ventriculography for assessment of physiologic and pharmacologic interventions, analysis of instantaneous time sequence of ventricular systolic and diastolic events, and quantitation of segmental abnormalities. The system is shown to provide the capability for computation of ventricular volumes and other measurements from operator-defined margins by greatly reducing the tedium and errors associated with manual planimetry. S.D.

A77-17366 **Quantitative analysis of regional myocardial performance in coronary artery disease.** D. K. Stewart, H. T. Dodge, and M. Frimer (University Hospital, Seattle, Wash.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 217-224. 12 refs. Grant No. NIH-HL-13517-04.

A quantitative method is used for the study of regional myocardial performance based on the frame-by-frame analysis of biplane left ventricular angiograms in subjects with significant coronary artery stenosis and a group of controls suspected of having coronary artery disease. The parameters measured were segmental ejection fraction, onset of effective systolic contraction, time to minimum length, duration of effective systolic contraction, time to midsystole, and maximum velocity of shortening. The results suggest that in the abnormal state, contraction not only starts late, but ends late or early and may be associated with hypokinesis. The findings of segmental compensation were unexpected and explain the rather frequent occurrence of normal overall ejection fraction in the presence of an obvious segmental contractile abnormality. S.D.

A77-17367 **Myocardial blood flow - Roentgen videodensitometry techniques.** H. C. Smith, R. A. Robb, and E. H. Wood (Mayo Clinic, Rochester, Minn.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 225-232. 16 refs.

A77-17368 **Nuclear cardiography and scintigraphy.** P. McLaughlin (Stanford University, Stanford, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 245-260. 63 refs.

The paper outlines the methods and capabilities of radionuclide angiography of left ventricular anatomy and shunts of central circulation, myocardial perfusion imaging, intracoronary microsphere myocardial imaging, and determination of myocardial flow using inert gases. Radionuclide angiography is also used to determine central blood volumes. Thallium-201 is currently undergoing in-

tensive investigation to assess its clinical applicability. Agents accumulated by normal myocardium and agents accumulating in acutely necrotic myocardium are discussed. Intracoronary macroaggregated scanning may be used to obtain information on right and left coronary microcirculation. With the advent of the portable gamma camera which may be taken into the catheterization laboratory, useful additional information about regional myocardial flow can be determined at the time of selective coronary arteriography without additional instrumentation of the patient. S.D.

A77-17369 **Three-dimensional imaging of the myocardium with isotopes.** T. F. Budinger (California, University, Berkeley, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 263-271. 24 refs. NIH-ERDA-supported research.

Three methods of imaging the three-dimensional distribution of isotopes in the myocardium are described: three-dimensional imaging using multiple gamma-camera views, longitudinal tomographic images with compensation for blurring, and transverse-section reconstruction using coincidence detection of annihilation gammas from positron-emitting isotopes. The principles of operation and limitations of each method are examined. Successful transverse section results are obtained by multiple views of the human thorax using the gamma camera, and longitudinal tomographic images of the heart are obtained by digital reconstruction of multiple pinhole images. Two examples of gating gamma-camera images serve to illustrate the feasibility of obtaining both images of the ventricular cavities and the myocardium. S.D.

A77-17370 **Dynamic radionuclide determination of regional left ventricular wall motion using a new digital imaging device.** P. Steele and D. Kirch (U.S. Veterans Administration Hospital, Denver, Colo.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 273-276. 5 refs. Research supported by the U.S. Veterans Administration.

A77-17371 **Positron emission reconstruction tomography for the assessment of regional myocardial metabolism by the administration of substrates labeled with cyclotron produced radionuclides.** M. M. Ter-Pogossian, E. J. Hoffman, R. E. Coleman, M. E. Phelps, M. J. Welch (Mallinekrodt Institute of Radiology, St. Louis, Mo.), E. S. Weiss, and B. E. Sobel (Washington University, St. Louis, Mo.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 277-282. 6 refs. Grants No. NIH-5-P01-HL-13851-13; No. NIH-1-P17-HL-17646-01; No. NIH-P0L-NS-06833.

A77-17372 **Assessment of left ventricular ejection fraction by radionuclide angiography - Comparison to echocardiography and serial measurements in patients with myocardial infarction.** H. R. Schelbert, H. Henning, R. A. O'Rourke, and W. L. Ashburn (California, University, San Diego, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 293-297. 8 refs.

A77-17373 * **The Stanford-Ames portable echocardioscope - A case study in technology transfer.** G. Schmidt and H. Miller (Stanford University, Stanford, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 307-311. Grant No. NGR-05-020-634.

The paper describes a lightweight portable battery-powered echocardioscope fabricated largely from readily available components. The transducer contains a piezoelectric crystal which acts as both an ultrasound pulse emitter and echo receiver, and the oscilloscope is of modular construction. The oscilloscope display can be produced in any of three different modes: A-mode, B-mode, and M-mode (time-motion) by sweeping the intensified points of light of the B-mode display vertically along the oscilloscope face. The resulting display can be photographed in a time exposure, thus providing a hardcopy record for the patient's chart or physician's records. The device is clinically validated on both normal subjects and patients by experienced echocardiographers. S.D.

A77-17374 * **The user's view of commercially available medical technology.** D. C. Harrison (Stanford University, Stanford, Calif.). In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 325-327. Grants No. NGL-05-020-634; No. NIH-5-P01-HL-15833-02.

The potential user of new medical equipment for imaging the cardiovascular system is often faced with the problem of deciding whether or not to accept a new piece of equipment or a new technological concept into the practice of cardiology. Considerations for acquiring new medical technology are discussed in some detail. Acquisition of new technology should depend on whether the equipment provides more and relevant clinical data, is for research or for limited use, is properly engineered for patient use, presents information in easily storable and retrievable form, is tested and validated clinically, is fabricated by a reliable manufacturer, is cost effective, and may be readily replaced by a new technology. S.D.

A77-17375 * **Work on cardiovascular imaging supported by NASA and Stanford University.** In: Cardiovascular imaging and image processing: Theory and practice - 1975; Proceedings of the Conference, Stanford, Calif., July 10-12, 1975. Palos Verdes Estates, Calif., Society of Photo-optical Instrumentation Engineers, 1975, p. 349-352. 55 refs. Research supported by Stanford University and NASA.

A bibliography of 55 works on cardiovascular imaging and related general cardiography is presented for the period ranging from mid-1975 back to 1968. The listing of papers is developed from a NASA library system computer search. The papers are divided by primary subject matter into the following categories: general cardiography including some comparisons of methods (22 papers), angiography (19 papers), echocardiography (11 papers), radioisotopes (1 paper), and magnetocardiography (2 papers). S.D.

A77-17399 **Responses of Purkinje cells in rabbit nodulus and uvula to natural vestibular and visual stimuli.** W. Precht (Max-Planck-Institut für Hirnforschung, Frankfurt am Main, West Germany), J. I. Simpson, and R. Llinas (Iowa, University, Iowa City, Iowa). *Pflügers Archiv*, vol. 367, no. 1, 1976, p. 1-6. 31 refs. NSF Grant No. GB-3545; Grants No. PHS-NS-09916; No. PHS-NS-05748.

A77-17400 **Nystagmic modulation of neuronal activity in rabbit cerebellar flocculus.** R. Llinas, J. I. Simpson (Iowa, University, Iowa City, Iowa), and W. Precht (Max-Planck-Institut für Hirnforschung, Frankfurt am Main, West Germany). *Pflügers Archiv*, vol. 367, no. 1, 1976, p. 7-13. 37 refs. NSF Grant No. GB-3545; Grants No. PHS-NS-09916; No. PHS-NS-05748.

Experiments were conducted on anesthetized and awake albino rats with implanted electrodes to assess the modulation of the firing properties of Purkinje cells and other cerebellar elements during horizontal vestibular nystagmus in the dark. The microelectrode was advanced into the cerebellum about 5-6 mm until it reached the

floccular level. Electrical activity was recorded from several neuronal elements in the flocculus. The results are discussed in terms of organization of neuronal responses and implications for floccular function in the oculomotor system. Major conclusions are that Purkinje cells showed both vestibular (Type I and Type II) and eye movement modulation of simple spike activity, and that presumed mossy fibers and granule cells exhibited both vestibular and nystagmic modulation in various combinations. In particular, floccular control of brain stem nuclei utilizes both vestibular and eye movement signals, along with all sensory and internal signals involved in gaze regulation. S.D.

A77-17428 * **Heart rate-left ventricular ejection time relations - Variations during postural change and cardiovascular challenges.** V. O. Lance (Lemuel Shattuck Hospital, Boston, Mass.) and D. H. Spodick (Tufts University, Boston, Mass.). *British Heart Journal*, vol. 38, Dec. 1976, p. 1332-1338. 29 refs. NASA-supported research.

Experiments were conducted on healthy human subjects to determine HR-LVET (Heart Rate-Left Ventricular Ejection Time) regression relations in different postures, including tilt, and during isometric exercise. The subjects were tested in the resting state in supine and sitting positions, during isometric handgrip in supine and sitting positions and during 70 deg headup tilt. The recordings included a bipolar electrocardiogram and a right external carotid pulse curve. Comparison of the HR-LVET relation for the conditions under analysis revealed differences among the respective regression equations, which can be explained by the well-established differences in stroke volume and ejection rate among these states. These differences appear to account for the fact that under conditions in which stroke volume variations should be the major determinant, slopes will be similar but intercepts will vary. Since substantial differences among intercepts are observed, caution should be exercised whenever the intercept factor is used to predict LVET for HR. S.D.

A77-17437 **Fuzzy sets for man-machine interaction.** P. J. MacVicar-Whelan. *International Journal of Man-Machine Studies*, vol. 8, Nov. 1976, p. 687-697. 15 refs.

A new type of experiment is proposed to better understand the fuzzy behavior of a human operator in a man-machine system. The published applications of fuzzy set theory to the control of a simple steam engine are used as a convenient example to illustrate how some of the current applications of fuzzy set theory may be modified to carry out this type of experiment. The rationale for this proposal is developed by reviewing studies of the classification of human height and applications of fuzzy set theory to handwritten character recognition and control system design. Based on this brief review, both the results to be expected from such an experiment and how they might be analyzed are discussed. A key result is that such experiments ought to provide a much better understanding of the operator's fuzzy algorithm for adapting his experience to the development of the fuzzy algorithm for the new task. (Author)

A77-17438 **Representation of functional hierarchies of movement in the brain.** L. J. Kohout (London, University; Essex, University, Colchester, England). *International Journal of Man-Machine Studies*, vol. 8, Nov. 1976, p. 699-709. 32 refs.

The brain performs control functions and environmental communication in a hierarchy of many different functional levels. In order to develop a suitable methodology for identification of individual functional levels, the paper discusses the problem of syntax of movement and its serial ordering as it has been formulated in a biological context by Lashley (1951), the problem of cybernetic equivalence of systems and the relationship of their structure to the behavior, and the basic questions of multilevel control systems as resolved by Bernshtein and Patee. Generalized topologies and abstract logics form the basis of the formal apparatus used. Particular attention is given to a discussion of fuzzification of models. S.D.

A77-17439 **Dynamics of the eye and head during an element of visual search.** G. H. Robinson, B. W. Koth, and J. P. Ringenbach (Wisconsin, University, Madison, Wis.). *Ergonomics*, vol. 19, Nov. 1976, p. 691-709. 32 refs. Research supported by the Wisconsin Alumni Research Foundation and NSF.

Measurements were made of the dynamics of the eye and head during an 'element' of visual search, defined as the coordinated sequence of movements beginning with the signal to refixate and ending with target discrimination and response. Independent variables were target angle, 20 to 100 degrees, certainty in target location, target brightness, target information content, and alcohol stress. Dependent performance measures included reaction times of the eye and head, number of eye movements, maximum head velocity, time to acquire target, and response time, as well as qualitative descriptions of the movement patterns. (Author)

A77-17440 **Individual variability in human response to whole-body vibration.** D. J. Oborne and D. A. Humphreys (Swansea, University College, Swansea, Wales). *Ergonomics*, vol. 19, Nov. 1976, p. 719-726. 12 refs.

This paper reports an experiment to obtain an equal sensation contour for whole-body vibration using an entirely new, but demonstrably valid and reliable, paradigm. Instead of requiring subjects to equate variable vibration stimuli of different frequencies with a fixed standard stimulus, the paradigm employed a series of matching tasks with the standard stimulus being produced by the subject in the previous matching task. The individual sensation contours produced provided strong indications of important significant differences between subjects with respect to response to vibration. Implications of these differences for the study of human response to vibration are discussed. (Author)

A77-17441 **A critical assessment of studies relating whole-body vibration to passenger comfort.** D. J. Oborne (Swansea, University College, Swansea, Wales). *Ergonomics*, vol. 19, Nov. 1976, p. 751-774. 64 refs.

This paper critically reviews the major work which has been carried out over the past 40 years to investigate the relationship between whole-body vibration and comfort. Although a fair amount of work has been completed in this area, this review demonstrates that the majority is unacceptable from most practical standpoints although some concordance exists. Finally, the paper shows that attempts which have been made to draw the field together (including an International Standard) to produce curves of equal comfort have not significantly increased out knowledge of how people react to whole-body vibration. (Author)

A77-17490 * **Reassessment of roles of oxygen and ultraviolet light in Precambrian evolution.** L. Margulis, M. Rambler (Boston University, Boston, Mass.), and J. C. G. Walker (National Astronomy and Ionosphere Center, Arecibo, P.R.). *Nature*, vol. 264, Dec. 16, 1976, p. 620-624. 58 refs. NASA-supported research.

It is argued that the transition to an oxidizing atmosphere preceded the origin of eukaryotic cells, which in turn must have preceded the origin of metazoa. Moreover, the number of methods by which organisms can protect themselves from harmful UV radiation is sufficiently large to suggest that solar UV, even when the atmosphere was anaerobic, was not such as to control the distribution and diversification of life. An alternative explanation for the late and sudden appearance of metazoa in lower Cambrian sediments is proposed, which is related to the mechanisms by which fully mature eukaryotic cells probably originated. There was probably a protracted evolution of modern genetic systems based on mitosis in cells which acquired organelles (e.g., plastids and mitochondria) by hereditary endosymbiosis. The origin of hard parts underlies the Cambrian explosion of metazoans. P.T.H.

A77-17529 **Recent developments in PLZT electrooptic shutters.** J. T. Cutchen, J. O. Harris, Jr., and G. R. Laguna (Sandia Laboratories, Albuquerque, N. Mex.). In: Polarized light: Instruments, devices, applications; Proceedings of the Seminar, San Diego, Calif., August 24, 25, 1976. Palos Verdes Estates, Calif., Society of Photo-Optical Instrumentation Engineers, 1976, p. 57-64. 18 refs. ERDA-USAF-Army-supported research.

PLZT electrooptic shutters utilized as thermal/flash protective devices (TFPD) are currently under development by Sandia Laboratories for the USAF Life Support System Program Office at Wright Patterson Air Force Base, Ohio and the U.S. Army Natick Laboratories, Natick, Massachusetts. The PLZT/TFPD is being developed to provide protection for aircrews and vehicle operators from temporary flashblindness effects and permanent retinal burns which may result from exposure to the brilliant flash of a nuclear detonation. The operational characteristics of PLZT (lanthanum-modified lead zirconate-titanate) electrooptic shutters is briefly described, and several applications are presented. Some of the recent developments in PLZT electrooptic shutter design are also described, with emphasis on a new approach for applying interdigital electrodes to polished PLZT wafers, techniques for bonding and mounting PLZT lens assemblies, and recent improvements in the efficiency of sheet polarizers. (Author)

A77-17542 **Ultrasonic detection of cardiovascular flow disturbances.** D. C. Winter, M. K. Wells, and R. J. Morgan (Colorado State University, Fort Collins, Colo.). *(Instrument Society of America, International Biomedical Sciences Instrumentation Symposium, 13th and Annual Rocky Mountain Bioengineering Symposium, 13th, Laramie, Wyo., May 3-5, 1976.) ISA Transactions*, vol. 15, no. 3, 1976, p. 237-241. 11 refs. NSF Grant No. ENG-75-07712.

A method is presented for detecting periods of disturbed blood flow using autocorrelograms of the audio signal from a pulsed ultrasound Doppler velocity meter (PUDVM). Autocorrelograms describe quantitatively how the form of a signal changes over time. Steady laminar and turbulent pipe flow in a hydraulic test tank are produced, and autocorrelograms of the audio signal of the centerline velocity as detected by the PUDVM using fast Fourier transform techniques are computed. It is shown that the autocorrelation coefficient averaged over a short length of time (64 ms) is significantly higher for laminar than for turbulent flow. Pulsatile flow in the hydraulic tank is also produced, and the mean autocorrelation coefficient at different phases of the flow cycle is computed. The regions of disturbed and undisturbed flow are predicted from the steady flow results. The disturbed flow first appears during the period of the highest forward velocities. These results indicate that the mean autocorrelation coefficient can serve as an indicator of the presence of flow disturbances. (Author)

A77-17565 * **Proton-tissue dose buildup factors.** J. W. Wilson (NASA, Langley Research Center, Hampton, Va.) and G. S. Khandelwal (Old Dominion University, Norfolk, Va.). *Health Physics*, vol. 31, Aug. 1976, p. 115-118. 16 refs.

When an object is exposed to external radiation, the dose field within the object is a complicated function of the character of the external radiation, the shape of the object (including orientation), and the object's material composition. In this note, the dose conversion factors for protons in tissue are represented using buildup factors. A parametric form for the buildup factors is obtained. The values of the parameters are derived from Monte Carlo calculations of various authors. All the necessary information to estimate nuclear reaction effects in proton irration of convex objects of arbitrary shape is included. S.D.

A77-17566 * **The stimulation of cardiac prostaglandin production by blood plasma and its relationship to the regulation of coronary flow in isolated isovolumic rabbit hearts.** R. L. Moretti, S. Abraham, and R. R. Ecker (Children's Hospital Medical Center, Oakland, Calif.). *Circulation Research*, vol. 39, Aug. 1976, p. 231-238. 32 refs. Grants No. NsG-2021; No. NIH-RR-05467.

A77-17569 * **Passive potassium ion permeability of Halobacterium halobium cell envelope membranes.** J. K. Lanyi and K. Hilliker (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field, Calif.). *Biochimica et Biophysica Acta*, vol. 448, 1976, p. 181-184. 21 refs. NASA-supported research.

A77-17571 * **Bactericidal effect of hydrogen peroxide on spacecraft isolates.** M. D. Wardle (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) and G. M. Renninger (Bionetics Corp., Hampton, Va.). *Applied Microbiology*, vol. 30, Oct. 1975, p. 710, 711. 7 refs. Contract No. NAS7-100.

Results are presented for an experimental study designed to assess the effect of hydrogen peroxide on both sporeforming and nonsporeforming spacecraft isolates as an initial step in determining its suitability for microbiological decontamination of certain United States spacecraft. Survivor data were obtained for eight bacterial isolates (six sporeformers and two nonsporeformers) recovered before launch Mariner 9 and exposed to concentrations of 3, 10, and 15% hydrogen peroxide. The effects of various concentrations of hydrogen peroxide on the spores are presented in tabular form, along with the percentage of survival of nonsporeformers exposed to hydrogen peroxide. No viable vegetative cells were recovered after a 10-min exposure time to any of the three concentration of hydrogen peroxide. S.D.

A77-17580 **Serum urea and amino nitrogen changes with exercise duration.** G. Haralambie and A. Berg (Medizinische Universitätsklinik, Freiburg im Breisgau, West Germany). *European Journal of Applied Physiology*, vol. 36, no. 1, 1976, p. 39-48. 46 refs.

In eight groups of healthy male athletes, aged 19-44 years, serum urea, alpha-amino nitrogen and free tyrosine were determined before and after physical exercise of different duration. Exercise was competitional running, skiing, march or bicycle ergometer work, its duration between 15 and 765 min. The results were compared with previous data. After about 60-70 min of exertion, there is a significant fall in serum amino nitrogen and a rise in urea and free tyrosine; the magnitude of these changes correlated well with the duration of exercise. Likewise, there is a significant correlation between increase in serum urea and decrease in amino nitrogen. The observed changes strongly suggest an increased breakdown of nitrogen-containing compounds during prolonged exercise. (Author)

A77-17581 **Effects of beta blockade and atropinisation on plasma catecholamine concentration during exercise.** C. T. M. Davies, J. R. Brotherhood, J. D. Few, and E. ZeidiFard (Medical Research Council, Environmental Physiology Unit; London School of Hygiene and Tropical Medicine, London, England). *European Journal of Applied Physiology*, vol. 36, no. 1, 1976, p. 49-56. 18 refs.

Experiments were carried out on five healthy male volunteers aged 25-43 yr to assess the variations of plasma catecholamine concentration during treadmill exercise following beta adrenergic and parasympathetic blockade by practolol and atropine. The physiological measurements included minute ventilation and oxygen uptake, while blood catecholamine concentration was determined by the semi-automated method of McCullough (1968). The results confirm the previous findings by Davies et al. (1974) that for a given type of exercise under normal conditions, the change in plasma catecholamine concentration is closely associated with relative aerobic energy expenditure. It is suggested that this change is primarily related to the closure of the splanchnic circulation associated with relative workload. S.D.

A77-17584 * **The metabolism of carbohydrates by extremely halophilic bacteria - Identification of galactonic acid as a product of galactose metabolism.** L. I. Hochstein, B. P. Dalton, and G. Pollock (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *Canadian Journal of Microbiology*, vol. 22, no. 8, 1976, p. 1191-1196. 12 refs.

A77-17585 * **A review of implant telemetry systems.** T. B. Fryer and H. Sandler (NASA, Ames Research Center, Moffett Field, Calif.). *Biotelemetry*, vol. 1, no. 6, 1974, p. 351-374. 180 refs.

A77-17586 * **Effects of subfornical organ extracts on salt-water balance in the rat.** J. Y. Summy-Long, I. L. Crawford, and W. B. Severs (Pennsylvania State University, Milton S. Hershey Medical Center, Hershey, Pa.). *Brain Research*, vol. 113, 1976, p. 499-516. 32 refs. Grant No. NsG-2122.

The subfornical organ (SFO) is a circumventricular structure located at the junction of the lamina terminalis and the tela choroidea of the third cerebral ventricle. SFO is histologically regarded as a neurosecretory structure, although the physiological effects or biochemical nature of such secretions are not yet ascertained. Results are presented for an experimental study designed to determine whether SFO extracts alter parameters associated with salt-water balance in the rat. The data obtained support the conclusion that SFO contains some water-soluble substance(s), easily released by incubation, dialyzable and heat stable, which influences the salt-water balance after injection into ventricular cerebrospinal fluid. Whether other brain tissues or plasma contains the same or similar material is not yet convincingly established. The observation that one or more active constituents are easily released from SFO upon incubation in potassium-enriched medium may be of value.
S.D.

A77-17598 **Interactions between diverse proteinoids and microspheres in simulation of primordial evolution.** L. L. Hsu and S. W. Fox (Miami, University, Coral Gables, Fla.). *BioSystems*, vol. 8, 1976, p. 89-101. 21 refs.

Experiments demonstrating an incorporation of different enzymelike activities into a single preparation of proteinoid microspheres provide a conceptual bias for the primitive lengthening of protometabolic pathways. An enhancement of one enzymelike activity by another proteinoid in the same microsphere has been found. This effect, plus the pathway-lengthening propensity of combinations of microspheres, indicates selective advantages contributing to adaptive protoselection. Data reported in this paper also bring into purview the concept of internally controlled variation. Inferences are derived for the origin of protosexuality in protocells. When allowance is made for a closer relationship to the environment than that needed in contemporary selection, the fundamental mechanistic requirements of protoevolution are regarded as met by the proteinoid microsphere. (Author)

A77-17637 # **Interaction between photoreceptors of the retina in vertebrates and their functional role (Vzaimodeistvie mezhdu fotoretseptorami setchatki pozvonochnykh i ikh funktsional'naia rol').** V. I. Gusel'nikov and A. S. Sidorov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 7, Oct.-Dec. 1976, p. 92-119. 122 refs. In Russian.

The paper outlines general concepts on the nature of photoreceptor response to light and on its mechanism of generation, with particular reference to the information presently available about the interaction between the photoreceptors across the horizontal cells of the retina. Results are presented regarding rod-rod and cone-cone interactions in the retina. The potential functional significance of photoreceptor interaction during visual perception is discussed. S.D.

A77-17722 # **Molecular biophysics (Molekuliarnaia biofizika).** M. V. Vol'kenshtein. Moscow, Izdatel'stvo Nauka, 1975. 616 p. 1301 refs. In Russian.

The work outlines the foundations of macromolecular physics and molecular biology, with particular reference to thermodynamics and theory of information as applied to biological processes. Attention is focused on problems related to the physics of proteins and especially to the physics of enzymatic processes. Physics of nucleic acids is discussed along with their functioning in biosynthesis of proteins. Also described are the theoretical essentials of radiographic, optical, and spectroscopical techniques for investigation of biopolymers. S.D.

A77-17772 **Depth perception through motion.** M. L. Braunstein (California, University, Irvine, Calif.). Research supported by the National Science Foundation. New York, Academic Press, Inc., 1976. 212 p. 157 refs. $13.50.

Following an overview of the paradox of depth perception along with illusions of motion in depth, the work outlines the geometrical considerations required for the study of depth perception in dynamic environments, based on graphic rather than mathematical demonstrations. Particular attention is given to the current state of knowledge about three major research problems: dynamic factors leading to the perception of depth, slant judgments in dynamic displays, and factors affecting the accuracy of perceived direction or rotary motion. A theoretical approach is presented in which perception is related to other forms of human problem solving and perceptual processes are viewed as heuristic processes. An appendix is included on the technique of computer animation used in a major portion of the research described in the book on the role of transformations in depth perception. S.D.

A77-17847 **Right hemispheric sensitivity for the McCollough effect.** G. E. Meyer (New York, State University, Amherst, N.Y.). *Nature*, vol. 264, Dec. 23-30, 1976, p. 751-753. 22 refs.

It has been found that pink McCollough effect hues, perceived by subjects after exposure to a green square-wave grating, are reported to be stronger in the left visual field even when initially processed by the right cerebral hemisphere. This phenomenon suggests a specialization for visual perception in the right cerebral hemisphere. A description is presented of tests concerning the strength of the McCollough effect in the left compared with the right cortical hemisphere. Three possible explanations for the stronger right hemisphere hues are discussed. G.R.

A77-17876 # **Functional topography of the dominant hemisphere /from data on the dynamics of regional cerebral circulation/ (Funktsional'nyi landshaft dominantnogo polushariia /po dannym dinamiki regional'nogo mozgovogo krovotoka/).** D. H. Ingvar (Lund Universitet, Lund, Sweden). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 711-722. 32 refs. In Russian.

The paper outlines the mechanisms and characteristics pertaining to human cerebral hemodynamics, with particular reference to the correlation of metabolism and function, physiology and psychic behavior. The data discussed are obtained by the Xe-133 isotope technique. Extensive evidence is presented on the characteristics of blood flow distribution in different cortical regions in so-called neurologically healthy subjects (chronic alcoholics), along with changes in blood flow for given motor and psychic activity. The findings obtained are discussed from the standpoint of functional anatomy and the role of different cortical regions in the actualization of psychic and motor activity. Particular attention is given to the characteristics of regional cerebral hemodynamics in the presence of disordered psychic functions in patients suffering from such disturbances as dementia and coma. S.D.

A77-17877 # **Effect of anxiety on human heart action under reduced motor activity /hypokinesia/ (Vliianie emotsii trevogi na serdechnuiu deiatel'nost' v usloviiakh snizhennoi dvigatel'noi aktivnosti /gipokinezii/).** B. M. Fedorov, V. V. Tkachev, L. A. Titova, and E. N. Kul'kov. *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 745-750. 10 refs. In Russian.

Experiments were conducted on 15 healthy young males to study the effect of anxiety-inducing dental procedures on the heart action under conditions of 30- and 49-day antiorthostatic hypokinesia in a strict bedridden regimen, where the head of the bed is lowered at an angle of -4 deg to the horizontal plane. It is found

that hypokinesia substantially enhances the emotional vulnerability of man. In particular, anxiety under hypokinetic conditions alters the activity of the ventricular myocardium relative to both cardiac rhythm and T wave of the electrocardiogram. S.D.

A77-17878 # **Mechanism and role of involuntary saccadic eye movements in the visual process (O mekhanizme i roli neproizvol'nykh sakkadicheskikh dvizhenii glaz v zritel'nom protsesse).** V. F. Ananin (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskogo Priborostroeniia, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 751-756. 15 refs. In Russian.

An experimental study was conducted on 150 subjects aged 18-50 yr to assess the temporal and amplitude characteristics of involuntary saccadic eye movements (ISM) for various types of stimulation: point fixation, in the dark without fixation point, fixation point of different angular size and brightness, as well as attention tests. 25 subjects were submitted for a year to a dynamic investigation of ISM. The subjects included blind persons with blindness length from 5 to 30 yr, as well as asthenopic, myopic, and emmetropic persons. It is shown that ISM generation is achieved within the framework of a self-maintained saccadic system with feedback to information processing centers and to the retina. This saccadic system performs two major functions in the visual process: transmission of information in the form of individual discrete portions of impulses, and regulation of the ISM amplitude in proportion to changes in the size of the receptor fields of the retina. S.D.

A77-17879 # **Effect of hyperventilation on light-induced depression of the alpha rhythm of EEG (Vliianie giperventiliatsii na svetovuiu depressiiu al'fa-ritma elektroentsefalogrammy).** R. D. Shmel'kina (Ukrainskii Institut Usovershenstvovaniia Vrachei, Kharkov, Ukrainian SSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 772-775. 19 refs. In Russian.

Experiments were conducted on 75 healthy subjects of both sexes (32M, 43F) aged 7-73 yr to assess the influence of hyperventilation on the depression of the EEG alpha rhythm in response to photostimulation. It is shown that a 3-min hyperventilation in most of the subjects leads to an attenuation of the light-induced depression of the alpha rhythm. This effect may be accounted for by attenuation of the excitability of the reticular formation under the action of hypocapnia. The effect of hyperventilation is most pronounced in persons up to the age of 16, which is attributed to the increased sensitivity of children and juveniles to hypocapnia. S.D.

A77-17880 # **A dynamic model for regulation of external respiration under physical load (Dinamicheskaia model' reguliatsii vneshnego dykhaniia pri fizicheskoi nagruzke).** I. M. Bykhovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 779-782. 5 refs. In Russian.

Results are presented for an investigation designed to develop the mathematical model of human respiration during exercise and to use this model to assess the dynamics of regulation of external respiration for different values of the parameters involved. The constitutive equations of the model are solved on a computer. Analysis of results of the study on the response of the respiratory system to variations of the parameters point to the significance of a feedback factor and of a parameter included in the adaptation equation to characterize the change in blood flow with changing metabolism in the steady-state regime. S.D.

A77-17881 # **Interhemisphere asymmetry of visual evoked potentials under conditions of involuntary and voluntary attention (O mezhpolusharnoi assimetrii zritel'nykh vyzvannykh potentsialov v usloviiakh neproizvol'nogo i proizvol'nogo vnimaniia).** L. D. Demina (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) and E. D. Khomskaia (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 783-789. 21 refs. In Russian.

Results are presented for an experimental study on visual evoked potentials recorded in four cerebral areas: right and left parieto-occipital and premotor. Attention is focused on interhemisphere correlation of evoked potentials during passive perception of stimuli (situation of involuntary attention) and during performance of sensory and motor tasks (situation of voluntary attention). Two modes of stimulus transmission are compared: central and lateral. The role of left and right cerebral hemisphere in actualization of different types of attention is discussed. S.D.

A77-17882 # **Variation of the amplitude of auditory evoked potentials during prolonged acoustic stimulation (Izmenenie amplitudy slukhovykh vyzvannykh potentsialov pri prodolzhitel'nom zvukovom razdrazhenii).** S. N. Khechinashvili, Z. Sh. Kevanishvili, and O. A. Khachidze (Tbilisskii Gosudarstvennyi Institut Usovershenstvovaniia Vrachei, Tiflis, Georgian SSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 790-796. 22 refs. In Russian.

Experiments were conducted on 7 subjects aged 24-45 yr with normal hearing to assess the behavior of cortical slow auditory evoked potentials (AEP) under the action of prolonged acoustic stimulation. It is shown that the amplitude of cortical slow AEP gradually decreases during prolonged acoustic stimulation, the degree and dynamics of decrease being nearly identical for acoustic stimuli of high and low intensity. Changing the parameters of acoustic stimuli (frequency and intensity) results in partial temporary interruption of sound and complete recovery of the AEP amplitude. The habituation observed for a sound of given frequency does not apply to a sound of another frequency. Unlike cortical slow AEP, the action potentials of the acoustic nerve during prolonged acoustic stimulation exhibit no regular variations. S.D.

A77-17883 # **Spikes of spindle and beta waves in response to significant signals in the EEG of individuals with practically no alpha rhythm (Vspyshki veretennykh i beta-kolebanii na znachimie signaly v EEG liudei, prakticheski lishennykh al'fa-ritma).** Iu. G. Kratin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 797-803. 10 refs. In Russian.

Results are presented for an investigation of the EEG of three healthy subjects (2M, 1F) who exhibit practically no alpha rhythm in their resting EEG. Particular attention is given to the mechanisms governing the analytical activity of the brain on the basis of data on cerebral biopotentials, especially the spikes of the spindle and beta waves recorded in the late B stage of the EEG in response to various types of stimuli. It is shown that in response to the execution order, spikes of fast rhythms can appear even when the effector response is inhibited. The findings are regarded as the manifestation of the activity of a hypothetical integrative system for analysis of signals by the brain, which regulates the excitation level of the brain's nonspecific activation apparatus. S.D.

A77-17884 # **Reflection of the biological significance of a stimulus in the amplitude dynamics of evoked potentials in man (Otrazhenie biologicheskoi znachimosti stimula v amplitudnoi dinamike vyzvannykh potentsialov).** A. A. Pirogov (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) and I. Mesarosh (Eotvos Lorand Tudomanyegyetem, Budapest, Hungary). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 804-810. 19 refs. In Russian.

An electroencephalographic investigation of 13 voluntary subjects revealed that repetition of tonal acoustic messages (1000 Hz, 30 msec duration) in a random order subject to normal distribution results in habituation of the late components of the evoked potentials derived from the central (Cz) and frontal (Fz) sections of the scalp. When a given acoustic stimulus is followed by a light flash, or when it is required to make a fist at the moment of light flash or switch off the light by pressing on a button, habituation of the components of the evoked potentials is observed only in the central lead and is definitely slowed down in the frontal lead. It is suggested that this process is due to the identification of the biological significance of the stimulus by the frontal lobe of the human brain. S.D.

A77-17885 # **Visual evoked potentials in right and left cerebral hemispheres in response to presentation of a staggered pattern at different sharpness levels (Zritel'nye vyzvannye potentsialy pravogo i levogo polusharii mozga na pred'iavlenie shakhmatnogo risunka pri razlichnykh urovniakh ego chetkosti).** L. R. Zenkov (Moskovskii Meditsinskii Institut, Moscow, USSR) and G. D. Panov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 818-824. 13 refs. In Russian.

A77-17886 # **Time parameters of simple motor reaction as indicators of the functional state of the human brain (Vremennye parametry prostoi dvigatel'noi reaktsii kak pokazateli funktsional'nogo sostoianiia mozga cheloveka).** T. S. Mel'nikova (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Sudebnoi Psikhiatrii, Moscow, USSR) and L. A. Farber (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 836-842. 20 refs. In Russian.

Experiments were conducted on 26 healthy right-handed subjects aged 18-35 yr to assess their latent period of motor reaction (LPMR) and to determine the motor reaction (MR) characteristics, scheduled at a given instant of time, as an integrative indicator of the processes taking place in the central nervous system. Reactions scheduled at a given instant of time did not reveal any reliable difference between anticipation and delay. Alternation of anticipating and delayed reactions to a conditioned signal is considered proof of continuous correction of MR according to the results of the preceding reaction. S.D.

A77-17887 # **Microinterval analysis of the interaction of a pair of short mechanical stimuli in the skin analyzer (Mikrointerval'nyi analiz vzaimodeistviia pary kratkikh mekhanorazdrazhenii v kozhnom analizatore).** D. S. Matoian (Erevanskii Gosudarstvennyi Universitet, Yerevan, Armenian SSR). *Fiziologiia Cheloveka*, vol. 2, Sept.-Oct. 1976, p. 866-870. 10 refs. In Russian.

The skin reception of the back of the hand in 3 subjects aged 23 yr was investigated with the aid of an electron mechanical 'adequatometer' which permits obtaining two noncoincident air pressure pulses separately adjustable in length, pressure, and stimulation area. It is shown that in the case of residual masking, the threshold pressure of the masked stimulus decreases with increasing values of the duration of the masked stimulus both when changing the interval between stimuli and when varying the interval between the disconnections of both stimuli. No intervals or small intevals between stimuli result in distortion of the curves relating pressure to duration of residual and inverse masking. S.D.

A77-17888 **Theoretical interstellar and prebiotic organic chemistry - A tentative methodology.** R. Caballol, R. Carbó, R. 163-173. 29 refs.

A theoretical methodology for the systematic study of the interstellar molecules is proposed. Some examples, dealing with formaldehyde excited states, formyl radical and ion, reactivity of the excited states of formic acid, methyl cyanide and methyl acetylene, as well as the reaction path of formaldehyde photodecomposition are presented. Quantum chemical methods appear to be a powerful tool to study the structure and behaviour of molecules related with interstellar space and the origin of life. (Author)

A77-17889 * **Vulcanism, mercury-sensitized photo-reactions and abiogenetic synthesis - A theoretical treatment.** S. M. Siegel (Hawaii, University, Honolulu, Hawaii) and B. Z. Siegel. *Origins of Life*, vol. 7, Aug. 1976, p. 175-181. 35 refs. Research supported by the Cottrell Foundation, University of Hawaii, NASA, and NATO.

Attention is called to the photodynamic and thermodynamic properties of Periodic Group IIb elements, most notably Hg, as they relate to ultra-violet sensitization in organic chemical reactions. The energy levels of 6 1P1 and 6 3P1 resonance states and the high vapor pressure (greater than 0.001 mm) of the metal at temperatures as low as 293 K bring Hg with the range of bond dissociation energies in most organic molecules and many inorganics. These capabilities considered together with recent evidence for Hg emission as a regular part of volcanic and geothermal processes provide the basis for a proposal that Hg-sensitized ultraviolet photo-reactions may have played a significant part in abiogenetic organic synthesis on the primative earth. (Author)

A77-17890 **Glycine and alanine synthesis from formaldehyde and hydroxylamine in the field of ultrasound waves.** A. Sokolskaia (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Origins of Life*, vol. 7, Aug. 1976, p. 183-185. 13 refs.

High intensity ultrasound waves coupled with other form of energy obviously were initiators of prebiochemical reactions; these reactions occurred in the water masses of the primordial earth. Essential biological substances like formaldehyde, ammonia, hydrocyanic acid, and amino acids compounds similar to carbohydrates by their properties were synthesized in the field of ultrasound waves in model experiments. The main participants of these reactions are water and gases of reductional atmosphere: hydrogen, carbon monoxide, methane, nitrogen and argon. Formation of amino acids takes place in aqueous solutions of formaldehyde and hydroxylamine. The ultrasonic irradiation yielded alanine and glycine, 0.00000020 and 0.00000018 molecules per 100 eV respectively. (Author)

A77-17891 * **Formation of amino acids by cobalt-60 irradiation of hydrogen cyanide solutions.** M. A. Sweeney, A. P. Toste (Santa Clara, University, Santa Clara, Calif.), and C. Ponnamperuma (Maryland, University, College Park, Md.). *Origins of Life*, vol. 7, Aug. 1976, p. 187-189. 16 refs. Grant No. NGR-21-002-317.

Experiments were conducted to study the pathway for the prebiotic origin of amino acids from hydrogen cyanide (HCN) under the action of ionizing radiation considered as an effective source of energy on the primitive earth. The irradiations were performed in a cobalt-60 source with a dose rate of 200,000 rad/hr. Seven naturally occurring amino acids are identified among the products formed by the hydrolysis of gamma-irradiated solutions of HCN: glycine, alanine, valine, serine, threonine, aspartic acid, and glutamic acid. The identity of these amino acids is established by gas chromatography and mass spectrometry. Control experiments provided evidence that the amino acids are not the result of contamination. S.D.

A77-17892 * **Formation of biologically relevant carboxylic acids during the gamma irradiation of acetic acid.** A. Negron-Mendoza and C. Ponnamperuma (Maryland, University, College Park, Md.). *Origins of Life*, vol. 7, Aug. 1976, p. 191-196. 14 refs. Grant No. NGR-21-002-317.

Irradiation of aqueous solutions of acetic acid with gamma rays produced several carboxylic acids in small yield. Their identification was based on the technique of gas chromatography combined with mass spectrometry. Some of these acids are Krebs Cycle intermediates. Their simultaneous formation in experiments simulating the primitive conditions on the earth suggests that metabolic pathways may have had their origin in prebiotic chemical processes. (Author)

A77-17893 **Prebiotic condensation reactions in an aqueous medium - A review of condensing agents.** J. Hulshof and C. Ponnamperuma (Maryland, University, College Park, Md.). *Origins of Life*, vol. 7, Aug. 1976, p. 197-224. 85 refs.

Biopolymers are formed by dehydration-type condensation reactions. In aqueous solutions dehydration reactions are very unlikely to happen spontaneously. However, coupling of dehydration-condensation to the hydrolysis of condensing agents could facilitate the synthesis of biopolymers in an aqueous solution. The literature shows that the peptides, nucleosides, nucleotides and oligonucleotides can be formed in this way. A careful study of the literature pertaining to prebiotic condensing agents was conducted in order to determine the most plausible prebiotic synthesis of biopolymers. The condensing agents taken into consideration are

cyanamide, carbodiimide, dicyanamide, dicyandiamide, hydrogen-cyanide-tetramer, cyanogen and the linear and cyclic polyphosphates. From both a chemical as well as biological point of view the polyphosphates appear to be the most plausible general prebiotic condensing agent. (Author)

A77-17894 **A cybernetic approach to the origin of the genetic coding mechanism. I - Methodological principles. II - Formation of the code series.** V. A. Ratner and A. G. Bachinskii (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Origins of Life*, vol. 7, Aug. 1976, p. 225-233. 14 refs.

Absence of chemical correspondence between monomers seems very likely to be the basic difference between the process of nucleic acid translation and nucleic acid transcription and replication as all codons have been assigned to definite amino acids. The paper discusses an approach in which the process suggested for the origin of the genetic code is treated as a stochastic process, postulating that the quasi-deterministic features of the code are the necessary consequences of its stochastic evolution and unique realization of the stochastic process. A hypothesis of unique key coincidence is proposed which indicates the mechanisms for the primary correspondence between the linear structures of polynucleotides and polypeptides. The hypothesis is based on the theory of Thomas (1970) concerning weak specific interactions between triplet-antitriplet pairs and amino acids in primitive polynucleotide-polypeptide complexes, where the main features are polarity-nonpolarity and the size of amino acids. S.D.

A77-17895 **The palirrhotrophic origin of energy metabolism.** J. W. Ycas (Texas A & M University, College Station, Tex.). *Origins of Life*, vol. 7, Aug. 1976, p. 235-238. 13 refs. NSF Grant No. BMS-75-04108.

It is proposed that the earliest cellular organisms relied upon a novel type of energy transduction termed palirrhotrophy, which generates a high-energy 'currency' chemiosmotically by exploiting the rhythmic variations in salinity which occur in the estuarine environment. Calculations based on estimates of contemporary chemiosmotic transduction efficiency suggest that such a mechanism could produce usable energy in high yield. The minimum polypeptide requirement for palirrhotrophy compares favorably with that of a fermentative pathway. It is suggested that palirrhotrophic organisms exist today but are difficult to detect. (Author)

A77-17896 * **General constraints on the Viking biology investigation.** H. P. Klein (NASA, Ames Research Center, Office of Life Sciences, Mountain View, Calif.). *Origins of Life*, vol. 7, Aug. 1976, p. 273-289. 6 refs.

The paper discusses some of the constraints pertaining to the Viking mission for detection of life on Mars, within which the Viking experiments were conceived, designed, and developed. The most important limitation to the entire study is the complete information about the nature of Mars, such as the chemical composition of the surface material of Mars and the exact identification of the constituents of that planet. Ways in which celestial mechanics places severe limitations on the Viking biology investigation are discussed. Major engineering constraints are examined relative to the accomodation of biology instrument inside the Viking lander and to the design of the instrument itself. Other constraints discussed concern the operational aspects of the mission and the testing program. S.D.

A77-17897 * **The pyrolytic release experiment - Measurement of carbon assimilation.** J. S. Hubbard (Georgia Institute of Technology, Atlanta, Ga.). *Origins of Life*, vol. 7, Aug. 1976, p. 281-292. 21 refs. Contracts No. NAS7-100; No. NAS1-12311; No. NAS1-13422; Grants No. NGR-05-002-308; No. NsG-7069.

The pyrolytic release experiment or carbon assimilation experiment is one of the three modules in the biology instrument on the 1976 Viking landers, which aims at detecting microbial life in Martian surface materials. The paper examines this experiment relative to the scientific assumptions in developing the test, the laboratory investigation supporting the experimental concept, and the operation and testing of the flight instrument. The only assumptions made are that the Martian species are adapted to function in their arid environment and that atmospheric CO2 or CO are assimilated by the species. Although the test is primarily designed to measure photoassimilation of CO2 or CO, the assimilation of these gases in heterotrophic or chemolithotrophic metabolism could also be detected. A new possibility for a carbon cycle on Mars is discussed. S.D.

A77-17898 * **Labeled Release - An experiment in radiorespirometry.** G. V. Levin and P. A. Straat (Biospherics, Inc., Rockville, Md.). *Origins of Life*, vol. 7, Aug. 1976, p. 293-311. 54 refs. Contract No. NAS1-9690.

The Labeled Release extraterrestrial life detection experiment onboard the Viking spacecraft is described as it will be implemented on the surface of Mars in 1976. This experiment is designed to detect heterotrophic life by supplying a dilute solution of radioactive organic substrates to a sample of Martian soil and monitoring for evolution of radioactive gas. A significantly attenuated response by a heat-sterilized control sample of the same soil would confirm a positive metabolic response. Experimental assumptions as well as criteria for the selection of organic substrates are presented. The Labeled Release nutrient has been widely tested, is versatile in eliciting terrestrial metabolic responses, and is stable to heat sterilization and to the long-term storage required before its use on Mars. A testing program has been conducted with flight-like instruments to acquire science data relevant to the interpretation of the Mars experiment. Factors involved in the delineation of a positive result are presented and the significance of the possible results discussed. (Author)

A77-17899 * **The search for life on Mars - Viking 1976 gas changes as indicators of biological activity.** V. I. Oyama, B. J. Berdahl, G. C. Carle, M. E. Lehwalt, and H. S. Ginoza (NASA, Ames Research Center, Moffett Field, Calif.). *Origins of Life*, vol. 7, Aug. 1976, p. 313-333. 15 refs.

The objective of the gas exchange experiment (GEX) in the Viking lander biology instrument package is to determine whether life exists in a 1-cc Martian soil sample delivered to it. The GEX is capable of maximum flexibility while protecting the indigenous organisms from exposure to physiologically incompatible medium. The discussion covers the biological premises implemented in the GEX, the requirements for the GEX M4 medium, the operational aspects of the incubation chamber, nonbiological and biological changes, and Antarctica soil experiment. Sources of biological gas changes are examined along with ways of differentiating biological gas changes from nonbiological ones. From cold incubation of low-frequency soils, it is concluded that decisive negative tests of GEX may require extended incubations beyond the nominal mission plan of 60 days, barring any outright information that negates the presence of life on Mars. S.D.

A77-17949 # **Vestibular responsiveness of flight personnel during investigation by the NKUK method (O vestibuliarnoi reaktivnosti letnogo sostava pri issledovanii metodom NKUK).** I. Ia. Mantur. *Voenno-Meditsinskii Zhurnal*, Oct. 1976, p. 58-60. In Russian.

Experiments were conducted on 200 pilots aged 20-45 yr with and without vegetovascular instability to study the responsiveness of the vestibular analyzer upon exposure to NKUK involving Coriolis acceleration, with special emphasis on revealing latent forms of motion sickness in the practice of aviation physical examination. The NKUK method is the following: 10 min after rotating in the Barany chair at a velocity of 180 deg/sec, each subject continuously and alternately tilts his head right and left at an angle not less than 30 deg to the vertical, with the rotation being in an anticlockwise direction; there is predominant stimulation of right ampullar receptors after the rotation ceases. It is shown that vestibular stimulation by the NKUK method has definite advantages over other vestibulometric techniques, since it makes it possible, in most cases, to reveal latent vestibulo-vegetative instability in flight personnel. S.D.

A77-18241 # **Fluid mechanical effects in the cardiovascular system due to vibrational stresses experienced in spaceflight.** G. M. Pantalos (Ohio State University, Columbus, Ohio). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display Incorporating the Forum on the Future of Air Transportation, 13th, Washington, D.C., Jan. 10-13, 1977, Paper 77-319.* 10 p. 23 refs. USAF-supported research.

The influence of vibrational stresses that are experienced in spaceflight is examined in relation to cardiovascular system functioning. Two series of experiments were conducted to determine the variation in transendothelial albumin transport and the variation in regional blood flow distribution in dogs exposed to Z-axis vibration at 0, 6, 10, and 14 Hz. Results showed vibration increases albumin transport at low cardiac outputs and increases regional blood flow in the aorta and other organs. Limited data on the variation of the pressure pulse and velocity waveforms are also presented. (Author)

A77-18286 * **Methods and new approaches to the calculation of physiological parameters by videodensitometry.** D. Kedem, D. P. Londstrom, T. C. Rhea, Jr., J. H. Nelson, R. R. Price, C. W. Smith, T. P. Graham, Jr., A. B. Brill (Vanderbilt University Hospital, Nashville, Tenn.), and D. Kedem. In: Low light level devices for science and technology; Proceedings of the Seminar, Reston, Va., March 22, 23, 1976. Palos Verdes Estates, Calif., Society of Photo-Optical Instrumentation Engineers, 1976, p. 118-125. 12 refs. Research supported by the American Heart Association; Grants No. NIH-HL-14192; No. NIH-HL-14454-041A1; Contract No. NAS8-30894.

A complex system featuring a video-camera connected to a video disk, cine (medical motion picture) camera and PDP-9 computer with various input/output facilities has been developed. This system enables the performance of quantitative analysis of various functions recorded in clinical studies. Several studies are described, such as heart chamber volume calculations, left ventricle ejection fraction, blood flow through the lungs and also the possibility of obtaining information about blood flow and constrictions in small cross-section vessels. (Author)

A77-18474 **Biological risks stemming from the electromagnetic environment in aerospace activities (Risques biologiques résultant de l'environnement électromagnétique dans les activités aérospatiales).** A. V. J. Martin (ESA, European Space Research and Technology Centre, Noordwijk, Netherlands). *L'Aéronautique et l'Astronautique*, no. 61, 1976, p. 53-72. 8 refs. In French.

The results of extensive calculations of energy absorbed by organic tissue in various parts of the body when exposed to electromagnetic radiation from spacecraft antennas in a wide frequency range are presented. Practical irradiation limits are calculated with the aid of simple formulas and graphs. Biological materials, muscle, bone, blood, etc., are treated as classical dielectrics. P.T.H.

A77-18504 # **Corrections for the dynamic behavior of the human operator in man-in-the-loop automatic control systems (Korektsiia na dinamichnoto povedenie na choveka-operator v sistemite za avtomatichno upravlenie).** I. Zaprianov, I. Barukh, and Iu. Benkov (B'lgarska Akademiia na Naukite, Institut po Tekhnicheska Kibernetika, Sofia, Bulgaria). *Problemi na Tekhnicheskata Kibernetika*, no. 4, 1976, p. 62-70. In Bulgarian.

A new set of two variants for correction of the dynamic behavior of the human operator in a man-in-the-loop automatic control systems is described. Pure lag on the part of the human operator is treated as a compensating network. The effect of gain and pure lag in the system is analyzed for the case of inexact compensation, and the compensating network is treated as a variable-gain link. Analog simulation results for a specific man-in-the-loop automatic control system are compared with inferences drawn from the study. R.D.V.

A77-18538 # **In vitro immunology.** T. A. Meister. In: Scientific investigations on the Skylab satellite; Conference, Huntsville, Ala., October 30-November 1, 1974, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1976, p. 495-504. 10 refs. (AIAA 74-1252)

An experiment was conducted in Skylab to study the combination of antigen and antibody under zero gravity conditions. The experiment tested antigen-antibody combination in vitro rather than in vivo. The method of radial immunodiffusion involving the use of immunodiffusion plates was employed. The results of the experiment show that immunodiffusion plates of special design can be utilized in flights. In such plates, antigen-antibody reaction proceeds essentially unchanged from the reaction which takes place on earth in identical plates. G.R.

A77-18546 **Quantitative analysis of exercise electrocardiograms and left ventricular angiocardiograms in patients with abnormal QRS complexes at rest.** M. L. Simoons, M. van den Brand, and P. G. Hugenholtz (Rotterdam, Erasmus Universiteit, Rotterdam, Netherlands). *Circulation*, vol. 55, Jan. 1977, p. 55-60. 18 refs.

A77-18547 **Thallium-201 myocardial perfusion imaging at rest and during exercise - Comparative sensitivity to electrocardiography in coronary artery disease.** I. K. Bailey, J. Rouleau, H. W. Strauss, B. Pitt (Johns Hopkins University; Johns Hopkins Hospital, Baltimore, Md.), and L. S. C. Griffith. *Circulation*, vol. 55, Jan. 1977, p. 79-87. 26 refs. Grant No. NIH-P-50-HL-17655-02.

A77-18548 **A comparison of real-time, two-dimensional echocardiography and cineangiography in detecting left ventricular asynergy.** J. A. Kisslo, D. Robertson, B. W. Gilbert, O. von Ramm, and V. S. Behar (Duke University Medical Center, Durham, N.C.). *Circulation*, vol. 55, Jan. 1977, p. 134-141. 8 refs. Research supported by the Canadian Heart Foundation; Grants No. PHS-HL-12715-07; No. PHS-HL-14228; No. PHS-HL-17670-01; No. PHS-HL-01613.

A comparative cineangiographic-echocardiographic experiment was performed on 105 patients to assess left ventricular motion by biplane cineangiography and real-time phased-array two-dimensional echocardiography. Ventricular wall motion is analyzed for five anatomical areas: anterolateral, posterolateral, apical, septal, and inferior. Since both techniques are prone to potential errors, areas of agreement and disagreement were looked for; when areas of disagreement occurred, explanations based on the capabilities and limitations of each method were sought. The echocardiographic images were deemed adequate for analysis in 82% of the regions, where the most difficult wall regions to visualize were the apical, inferior, and anterolateral. 18% of the discrepancies noted were due to echocardiographic observer error, 35% to the inadequacy of the echocardiographic image, and 27% to errors in angiographic detection. Combination of the two techniques would yield more complete information on left ventricular asynergy. S.D.

A77-18549 **The response of healthy men to treadmill exercise.** R. A. Wolthuis, J. Fischer, J. H. Triebwasser (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), and V. F. Froelicher, Jr. (USAF, Wilford Hall Medical Center, Lackland AFB, Tex.). *Circulation*, vol. 55, Jan. 1977, p. 153-157. 30 refs.

Heart rates, blood pressures, and functional responses to submaximal, maximal and postexertional treadmill testing are presented for a group of 704 healthy, asymptomatic aircrewmen referred to the USAF School of Aerospace Medicine. The indicated measurements are individually described by the use of percentiles. These data provide the practicing clinician with an accurate and complete description of the response of healthy men to treadmill exercise. (Author)

A77-18736 **Real-time digital echocardiography using burst analog sampling.** R. J. Myrick (Hewlett-Packard Co., Waltham, Mass.) and R. M. Arthur (Washington University, St. Louis, Mo.). *IEEE Transactions on Sonics and Ultrasonics*, vol. SU-24, Jan. 1977, p. 19-23. 21 refs.

Analog domain samples, acquired at high speed during the period of the echo from an ultrasonic pulse were stored in a series of sample-and-hold circuits. Analog samples were read out slowly for analog-to-digital (A/D) conversion during the subsequent interval before the next ultrasonic pulse. Burst analog sampling circuitry was combined with a conventional 9-bit A/D converter and a minicomputer to form a digital echocardiograph. An effective sample rate of 7 MHz was obtained with an actual A/D rate of 70 KHz. Gain could be altered under processor control for automatic depth compensation. The A/D rate could be varied by the processor to make analysis context dependent. The system operated in real time at 100 ultrasonic pulses/sec. It was tested in A-mode and time-motion studies of cardiac structures. (Author)

A77-18744 # **Modular programming system for an integrated robot (Modul'naia sistema programmnogo obespecheniia integral'nogo robota).** V. V. Nikiforov (Akademiia Nauk SSSR, Institut Avtomatiki i Protsessov Upravleniia, Vladivostok, USSR), E. I. Iurevich (Leningradskii Politekhnicheskii Institut, Leningrad, USSR), S. I. Novachenko, and V. A. Pavlov. *Upravliaiushchie Sistemy i Mashiny*, Sept.-Oct. 1976, p. 57-62. 5 refs. In Russian.

The paper describes the main features of a modular algorithmic system for robot control designed to carry out the intellectual functions of an adaptive robot with artificial intelligence capable of performing such operations as search and selection among unordered objects, assembly operations, etc. The program modules are of two types - 'task' modules concerned with immediate realization of a given robot functioning program, and 'operation' modules involved with coordination of tasks and correct functioning of the whole algorithmic system. Operation modules include program selection, interrupt reactions and processing, timing, reply generation, storage link, and system control, while task modules include operator command input, decoding of instructions, plotting of trajectories, calculation of control actions, drive control, and interrogation of position and tactile sensors. P.T.H.

A77-18763 * **Gynecological considerations on the participation of females in future space flights.** H. G. Mutke (Deutsche Gesellschaft für Luft- und Raumfahrtmedizin, Munich, West Germany) and E. C. Burchard (NASA, Johnson Space Center, Houston, Tex.). *Raumfahrtforschung*, vol. 20, Nov.-Dec. 1976, p. 292-294. 38 refs.

The NASA Space Shuttle Program in connection with the European Spacelab will provide the opportunity for women to participate in space flight as scientist crew members within the 1980's and 1990's. It is, therefore, necessary to examine gynecologic problems which might have to be considered in connection with these activities. Possible problem areas are related to aspects of menstrual cycle, hormone production disturbances, conception, pregnancy, and delivery. Psychological factors concerning the employment of mixed male-female crews must also be taken into account. Approaches for investigating these problems are discussed, giving attention to the conduction of experiments with female animals. G.R.

A77-18896 **Chemical evolution and energetics of reactions in aqueous solutions on the primitive earth.** R. Buvet and F. Stoetzel (Paris XII, Université, Créteil, Val-de-Marne, France). *Origins of Life*, vol. 7, Apr. 1976, p. 93-107. 25 refs.

Basic assumptions on chemical biogenesis are reviewed, including corollaries distinguishing reactions involving protobiota and reactions in living organisms today, and guidelines for laboratory research on bioprocesses obeying energetically based statics and dynamics of chemical processes affecting carbon compounds in aqueous media in the absence of enzymic catalysts are indicated. The CERES research program is described, with emphasis on accumulation of energy on the prebiotic earth. Variations of responses of a mixture subjected to sparking electrodes and heating are monitored by discontinuous sampling, IR and UV spectroscopy, gas chromatography, acidimetry, and polarography on Au and Pt rotating electrodes. R.D.V.

A77-18897 **Cell-free systems of polypeptide biosynthesis and approaches to the evolution of translation apparatus.** A. S. Spirin (Academy of Sciences, Institute of Protein Research, Pushchino, USSR). *Origins of Life*, vol. 7, Apr. 1976, p. 109-118. 17 refs.

A77-18898 **Chemical evolution of photosynthesis.** A. A. Krasnovskii (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Origins of Life*, vol. 7, Apr. 1976, p. 133-143. 29 refs.

The utilization of solar energy during the evolution of carbonaceous matter on earth, solar-energy conversion in the membranes of primary probionts, and solar-energy conversion modes during biological evolution are considered on the basis of data from laboratory experiments. The employment of inorganic photoreceptors by probionts is discussed along with the synthesis of porphin from pyrrole and formaldehyde, the photochemistry of porphyrins, and photochemical reactions in probiont membranes. The role of pigments in photosynthetic cells is examined, emphasizing the evolution of blue-green algae and photosynthetic bacteria. F.G.M.

A77-18899 **A hypothesis of the evolution of biological energy transducers.** V. P. Skulachev (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Origins of Life*, vol. 7, Apr. 1976, p. 145-160. 29 refs.

The evolutionary development of the system of intracellular energy-conserving processes is considered within the framework of the general concept of the biosphere originally postulated by Oparin (1957). It is assumed that the ATP-mediated coupling of energy-supplying and energy-consuming processes is an ancient and most fundamental principle of bioenergetics. Experiments are discussed which show that a photoelectric battery can be reconstituted in a rather simple mixture containing a chlorophyll-protein complex plus a phospholipid and that such a system can utilize the accumulated electric energy for uphill transport of ions. Maintenance of uphill ion transport at night is investigated along with ADP phosphorylation, the role of bacteriorhodopsin, and the function of intracellular organelles. It is suggested that: (1) photosynthesis originally involved excitation of the adenine part of ADP by UV light followed by ADP phosphorylation with inorganic phosphate; (2) this primitive 'UV photosynthesis' was replaced by visible-light photosynthesis requiring chlorophyll; and (3) the primitive chlorophyll-containing cell included an electrogenic ATPase in its membrane to carry out osmotic work in the absence of light. F.G.M.

A77-18924 # **Dependence of the vital staining of brain cortex tissues on the nature of their blood supply (Zavisimost' prizhiznennoi okraski tkanei kory golovnogo mosga ot kharaktera ikh krovosnabzheniia).** M. O. Samoilov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 230, Oct. 1, 1976, p. 953-956. 7 refs. In Russian.

Tests were performed on brain cortex specimens to determine the effect of a vital dye on perivascular tissues as a function of the nature of their blood supply. Methylene blue dye was applied to the brains of a rabbit and a cat, both of them drugged. Staining of the neurons of the cortex took place after 20-30 min at a specimen temperature of 37.5 C. Special attention was given to the analysis of the distribution of intensely stained zones around microvessels of different functional role. B.J.

A77-18949 # **Stability and stabilization of programmed movements of a robot manipulator (Ustoichivost' i stabilizatsiia programmnykh dvizhenii robota-manipuliatora).** A. V. Timofeev and Iu. V. Ekalo. *Avtomatika i Telemekhanika,* Oct. 1976, p. 148-156. 10 refs. In Russian.

Control laws are synthesized for controlling the moments of actuators of a robot manipulator, which ensure stability of its programmed movements under different degrees of information on the dynamic equations. The laws ensure performance of a given programmed movement of the manipulator in the presence of initial disturbances. Computer simulations show that the adaptive stabilization algorithms are reliable under these circumstances. P.T.H.

A77-18953 # **Experimental psychophysiology in space investigations (Eksperimental'naia psikhofiziologiia v kosmicheskikh issledovaniiakh).** L. S. Khachatur'iants, L. P. Grimak, and E. V. Khrunov. Moscow, Izdatel'stvo Nauka, 1976. 400 p. 276 refs. In Russian.

The present works examines the results of theoretical and experimental investigations directed to study the psychophysiological features pertaining to the state and activity of man in space flight, with special emphasis on his adaptation to space conditions. Modeling of the physical conditions for an astronaut's behavior is discussed along with the modeling of his mental states during intravehicular and extravehicular activities. Particular attention is given to the astronaut's operation in unforeseen flight situations. S.D.

A77-19001 # **The phasic character of color sensitivity of the visual analyzer (O faznosti protsessa tsvetovoi chuvstvitel'nosti zritel'nogo analizatora).** E. B. Rabkin, E. G. Sokolova, E. I. Loseva, T. L. Sosnova, and V. V. Golubev (Ministerstvo Putei Soobshcheniia, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 62, Oct. 1976, p. 1443-1446. 8 refs. In Russian.

Experiments were conducted on healthy subjects with normal trichromatic vision to assess the time thresholds of chromatic adaptation to visual fatigue during prolonged (6-8 min) uninterrupted adaptation to spectral stimuli corresponding to the red-yellow (585-650 nm) and green-yellow (535-585 nm) spectral regions. It is found that the state of color sensitivity undergoes changes consisting of alternating phases of active (correct) and passive (erroneous) discrimination of color. The time of duration of these phases is dependent on the wavelength of the adaptation stimulus, and the phasic character of color sensitivity is subject to circadian rhythm. The beginning of adaptation is marked by the active discrimination phase, then both phases seem to level up, and at the end of the adaptation period the passive discrimination phase is greatly enhanced. S.D.

A77-19002 # **Effect of centrifugal force on nystagmus during angular accelerations (Vliianie tsentrobezhnoi sily na nistagm pri uglovykh uskoreniiakh).** Iu. K. Stolbkov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 62, Oct. 1976, p. 1447-1451. 8 refs. In Russian.

Rabbits in the prone position were subjected to angular rotation on a special rotary rig with programmed control, where the head was so oriented that the lateral semicircular canals lay in the rotation plane. The rotation was performed according to a three-stage program consisting of a positive angular acceleration of 10 deg per sec per sec, rotation at a constant angular velocity of 166 deg/sec during 2 min, and an angular deceleration of 10 deg per sec per sec. It is found that a combined stimulation of the ampullar and otolith sections of the vestibular apparatus results in inhibiting the nystagmus. This effect takes place both during nasal and during caudal shifts of the otolith membranes. Centrifugal force of increasing or decreasing intensity is found to reduce the intensity of the nystagmus. S.D.

A77-19003 # **Thermal regulation in rats during combined heat and cold adaptation (Termoreguliatsiia krys pri kombinirovannoi teplovoi i kholodovoi adaptatsii).** Iu. I. Rossomakhin (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 62, Oct. 1976, p. 1518-1524. 20 refs. In Russian.

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STAR ENTRIES

N77-14078# Simon Stevin Instituut voor Wetenschappelijk Onderzoek, Brugge (Belgium).
SEPARATION METHODS IN SPACE BIOLOGY
H. Peeters *In* ESA Mater. Sci. in Space Sep. 1976 p 129-133 refs
Avail: NTIS HC A22/MF A01

Papers on electrophoresis, single crystals, melting and solidification of metals, glasses and ceramics, and fluid physics thermodynamics are presented. They provide an up-to-date appraisal of the theories and technology that can and are being applied in the manufacture of new and improved materials in space including the results of last year's Apollo Soyuz Test Project.

N77-14081# Max-Planck-Institut fuer Biochemie, Martinsried bei Muenchen (West Germany).
IMMUNOLOGICAL ASPECTS IN SPACE EXPERIMENTS AND THE POSSIBILITIES OF CELL SEPARATION BY CONTINUOUS-FLOW ELECTROPHORESIS
D. Leihener *In* ESA Mater. Sci. in Space Sep. 1976 p 149-154 refs
Avail: NTIS HC A22/MF A01

N77-14082# Oregon Univ., Portland. Health Sciences Center.
DETAILED RESULTS OF ASTP EXPERIMENT MA-011
G. V. F. Seaman, R. E. Allen (NASA, Marshall Space Flight Center), G. H. Barlow (Abbott Labs., Chicago), and M. Bier (Veteran's Admin. Hosp., Tucson, Ariz.) *In* ESA Mater. Sci. in Space Sep. 1976 p 155-166 refs

Avail: NTIS HC A22/MF A01 CSCL 06B

N77-14083# British Aircraft Corp. (Operating) Ltd., Bristol (England). Electronic and Space Systems Group.
PRELIMINARY STUDY OF A GENERAL-PURPOSE FLOATING-ZONE ELECTROPHORESIS FACILITY FOR SPACELAB
G. Lewis, P. R. Foster (Scot. Natl. Blood Transfusion Serv.), and B. White (Scot. Natl. Blood Transfusion Serv.) *In* ESA Mater. Sci. in Space Sep. 1976 p 167-174 refs

Avail: NTIS HC A22/MF A01

N77-14084*# General Electric Co., Philadelphia, Pa. Space Sciences Lab.
CONTINUOUS-FLOW ELECTROPHORETIC SEPARATOR FOR BIOLOGICALS
L. R. McCreight, R. N. Griffin, and R. J. Locker *In* ESA Mater. Sci. in Space Sep. 1976 p 175-179 Sponsored in part by NASA
Avail: NTIS HC A22/MF A01 CSCL 06B

N77-14729*# Kanner (Leo) Associates, Redwood City, Calif.
THE EFFECT OF PROLONGED HYPOKINESIS ON THE HEART MUSCLE OF RATS
I. Prokhazka, I. V. Khavkina, and Z. I. Barbashova Washington NASA 20 Dec. 1976 11 p refs Transl. into ENGLISH from Fiziologicheskiy Zhurnal SSSR (Kiev), v. 59, No. 8, 1973 p 1237-1241
(Contract NASw-2790)
(NASA-TT-F-17332) Avail: NTIS HC A02/MF A01 CSCL 06C

In test animals (rats), 30-40 days of hypokinesis resulted in a sharp decrease in body weight and heart weight (especially the right ventricle). Weakening of the contractility of the myocardium and its resistance to hypoxic stress were found. In this case, a decrease in the anaerobic metabolism rate was found in the ventricles: of glycolysis and glycogenolysis in the right and glycogenolysis in the left. The glycogen content of the heart muscle of the rat was unchanged after 30-40 days of hypokinesis. Author

N77-14730*# Boeing Co., Houston, Tex.
SEVERAL METHODS FOR CONCENTRATING BACTERIA IN FLUID SAMPLES Quarterly Report, Apr. - Jun. 1976
Richard R. Thomas Aug. 1976 52 p refs
(Contract NAS5-22545)
(NASA-CR-144830) Avail: NTIS HC A04/MF A01 CSCL 06C

The sensitivities of the firefly luciferase - ATP flow system and luminol flow system were established as 300,000 E. coli per milliliter and 10,000 E. coli per milliliter respectively. To achieve the detection limit of 1,000 bacteria per milliliter previously established, a method of concentrating microorganisms using a sartorius membranfilter system is investigated. Catalase in 50% ethanol is found to be a stable luminol standard and can be used up to 24 hours with only a 10% loss of activity. The luminol reagent is also stable over a 24 hour period. A method of preparing relatively inexpensive luciferase from desicated firefly tails is developed. Author

N77-14731*# Kanner (Leo) Associates, Redwood City, Calif.
THE STERILIZING ACTION OF A GASEOUS FORMOL: USE OF A CHAMBER EQUIPPED WITH A VENTILATION SYSTEM
M. Dupeu Washington NASA Jan. 1977 24 p refs Transl. into ENGLISH of Ouest Med. (France), v. 29, no 17, 1976 p 1149-1158
(Contract NASw-2790)
(NASA-TT-F-17513) Avail: NTIS HC A02/MF A01 CSCL 06B

Formol was used in a chamber with forced ventilation, varying the gaseous formol concentration and the exposure time. This method has made it possible to determine the bacteriostatic and bactericidal activity of this agent against microorganisms frequently encountered in a hospital environment, examined under practical conditions. Author

N77-14732*# GARD, Inc., Niles, Ill.
STUDY OF REMOVAL OF AMMONIA FROM URINE VAPOR BY DUAL CATALYST Final Report, May - Oct. 1976
P. Budininkas Nov. 1976 40 p refs
(Contract NAS2-9219)
(NASA-CR-151930) Avail: NTIS HC A03/MF A01 CSCL 06B

The feasibility of ammonia removal from urine vapor by a low temperature dual-catalyst system was investigated. The process is based on the initial catalytic oxidation of ammonia present in urine vapor to nitrogen and nitrous oxide, followed by a catalytic decomposition of the nitrous oxide formed into its elements. The most active catalysts for the oxidation of ammonia and for the decomposition of N2O, identified in screening tests, were then combined into dual catalyst systems and tested to establish their overall efficiencies for the removal of ammonia from artificial gas mixtures. Dual catalyst systems capable of ammonia removal from the artificial gas mixtures were then tested with the actual urine vapor produced by boiling untreated urine. A suitable dual catalyst bed arrangement was found that achieved the removal of ammonia and organic carbon, and recovered water of good quality from urine vapor. Author

N77-14733# Mississippi State Univ., Mississippi State. Water Resources Research Inst.
THE EFFECTS OF VARIATIONS IN TURBIDITY ON CYCLES OF PLANKTONIC AND BENTHIC ORGANISMS IN FLOOD CONTROL RESERVOIRS
Y. J. McGaha, John W. Burris, and Charles M. Cooper Jul. 1976 47 p refs Prepared in cooperation with Miss. Univ., University Sponsored by Interior Dept.

(PB-256555/4; W76-11172; OWRT-A-090-MISS(1)) Avail: NTIS HC A03/MF A01 CSCL 13B

The effects of turbidity on plankton and macrobenthos cycles in four northern Mississippi flood control reservoirs were studied. Turbidity measurements in part per million SiO2 were analyzed with other concomitant physiochemical data to ascertain the effects of suspended materials on planktonic and benthic cycles in the impoundments. A quantitative plankton analysis was made, and 27 of the most abundant genera were entered in a computerized stepwise regression analysis against 20 predictor variables consisting of the physiochemical data. The main emphasis of the bethos was in Grenada Reservoir, Mississippi. GRA

N77-14734 Polish Academy of Sciences, Warsaw.
ULTRASOUDCARDIOGRAPHIC NORMS OF THE LEFT VENTRICLE, THE MITRAL VALVE, AND THE INTERCHAMBER SEPTUM AMONG CHILDREN OF SPECIAL AGE GROUPS [NORMY ULTRASONOKARDIOGRAFICZNE LEWET KOMORY ZASTAWKI DWUDZIELNEJ I PPZEGRODY MIEDZYKOMOROWEJ U DZIECI W POSZCZEGOLNYCH GRUPACH WIEKU]
Krystyna Borkowska 11 Mar. 1976 68 p refs In POLISH Avail: Issuing Activity

On the basis of studies of 436 healthy children aged 1 to 17 years, ultrasoudcardiographic norms of the left ventricle, the mitral valve, and the interchamber septum were derived, and a marked dynamic dependency of calculated values of individual parameters on the physiological development of the heart structures was discovered. For the majority of the studied parameters, abrupt growth of body surface in certain periods of the child's life (5-6, 13-14) and physiological deceleration of heart activity were observed to exert a strong influence on the results of the ultrasoudcardiographic tests. The derived norms taking into account yearly age intervals can have practical application in evaluating echc-cardiograms of children with various heart ailments. Author

N77-14735* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ACTUATOR DEVICE FOR ARTIFICIAL LEG Patent
John L. Burch, inventor (to NASA) Issued 7 Dec. 1976 7 p Filed 12 Sep. 1975 Supersedes N75-32767 (13 - 23, p 2963)
(NASA-Case-MFS-23225-1; US-Patent-3,995,324; US-Patent-Appl-SN-612965; US-Patent-Class-3-1.2; US-Patent-Class-3-14) Avail: US Patent Office CSCL 06B

An actuator device is described for moving an artificial leg of a person having a prosthesis replacing an entire leg and hip joint. The device includes a first articulated hip joint assembly carried by the natural leg and a second articulated hip joint assembly carried by the prosthesis whereby energy from the movement of the natural leg is transferred by a compressible fluid from the first hip joint assembly to the second hip joint assembly for moving the artificial leg.
Official Gazette of the U.S. Patent Office

N77-14736* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LIQUID COOLED BRASSIERE AND METHOD OF DIAGNOSING MALIGNANT TUMORS THEREWITH Patent
William Elkins (Acurex Corp.), Bill Alvin Williams, and Ernest Glenn Tickner, inventors (to NASA) (Acurex Corp.) Issued 7 Dec. 1976 8 p Filed 27 Jan. 1976 Supersedes N76-18782 (14 - 09, p 1168)
(NASA-Case-ARC-11007-1; US-Patent-3,995,621; US-Patent-Appl-SN-652948; US-Patent-Class-128-2H; US-Patent-Class-128-379; US-Patent-Class-128-400; US-Patent-Class-128-402) Avail: US Patent Office CSCL 06B

A device for enhancing the detection of malignant tissue in the breasts of a woman was described. A brassiere-like garment which is fitted with a pair of liquid-perfused cooling panels which completely and compliantly cover the breasts and upper torso was studied. The garment is connected by plastic tubing to a liquid cooling system comprising a fluid pump, a solenoid control valve for controlling the flow of fluid to either the cooling unit or the heating unit, a fluid reservoir, a temperature sensor in the reservoir, and a restrictor valve to control the pressure in the garment inlet cooling line.
Official Gazette of the U.S. Patent Office

N77-14737* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METHOD AND SYSTEM FOR IN VIVO MEASUREMENT OF BONE TISSUE USING A TWO LEVEL ENERGY SOURCE Patent
John R. Cameron (Wisconsin U., Madison) and Philip F. Judy, inventors (to NASA) (Wisconsin U., Madison) Issued 7 Dec. 1976 8 p Filed 11 Mar. 1975 Supersedes N75-21948 (13 - 13, p 1552) Sponsored by NASA
(NASA-Case-MSC-14276-1; US-Patent-3,996,471; US-Patent-Appl-SN-557430; US-Patent-Class-250-444; US-Patent-Class-250-498; US-Patent-Class-250-363R) Avail: US Patent Office CSCL 06B

Methods and apparatus are provided for radiologically determining the bone mineral content of living human bone tissue independently of the concurrent presence of adipose and other soft tissues. A target section of the body of the subject is irradiated with a beam of penetrative radiations of preselected energy to determine the attenuation of such beam with respect to the intensity of each of two radiations of different predetermined energy levels. The resulting measurements are then employed to determine bone mineral content.
Official Gazette of the U.S. Patent Office

N77-14738* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PERCUTANEOUS CONNECTOR DEVICE Patent
Walter E. Parsons, inventor (to NASA) Issued 7 Dec. 1976 6 p Filed 16 Sep. 1975 Supersedes N76-19816 (14 - 10, p 1303)
(NASA-Case-KSC-10849-1; US-Patent-3,995,644; US-Patent-Appl-SN-613734; US-Patent-Class-128-418; US-Patent-Class-3-1.1; US-Patent-Class-339-252R) Avail: US Patent Office CSCL 06B

A device is reported for facilitating the passage of electrical signals from an external source through the skin of a patient to internal portions of the body such as muscles and nerves. The connector device includes a bio-compatible shell having an enlarged disk shaped portion for being implanted below the skin of the patient. The shell has a first and second electrically conductive post carried therein upon which a plug can be readily connected and disconnected. A modified form of the invention utilizes a unipolar connector that is adapted to be plugged into a shell implanted below the skin of a patient. Both of the connector devices are designed to be separated when a predetermined force is applied. This prevents excessive force from being applied to the implanted bio-compatible shell.
Official Gazette of the U.S. Patent Office

N77-14739# Michigan Univ., Ann Arbor. Dept. of Chemical Engineering.
EVALUATION OF THE COMPATIBILITY OF MATERIALS IN CONTACT WITH BLOOD Annual Report, Jun. 1975 - Jun. 1976
J. S. Schultz, A. A. Cizrkowski, J. D. Goddard, S. M. Lindenauer, and J. S. Penner Jul. 1976 85 p refs
(Contract N01-HB-4-2962)
(PB-257219/6; NIH-N01-HB-4-2962-2) Avail: NTIS HC A05/MF A01 CSCL 06L

An ex-vivo test procedure using dogs was developed for testing the thrombogenicity of biomaterials in contact with blood. A couette-type test chamber capable of producing independent mass transfer and shear stress variations on a rotating specimen in the form of a 3/16 inch x 4 inch shaft was used for measuring the formation rate and composition of thrombus formed under

well defined hemodynamic conditions. The design of these experiments consisted of a parallel arrangement of test chambers such that two materials were tested simultaneously with one material being a reference material. GRA

N77-14740# Nuclear Regulatory Commission, Washington, D.C. Office of Nuclear Reactor Regulation.

OCCUPATIONAL RADIATION EXPOSURE AT LIGHT WATER COOLED POWER REACTORS, 1969-1975

Thomas D. Murphy, Nadia J. Dayem, J. Stewart Bland, and Walter J. Pasciak Jun. 1976 25 p

(PB-257054/7; NUREG-0109) Avail: NTIS HC A02/MF A01 CSCL 06J

An updated compilation of occupational radiation exposures at commercial light water cooled power reactors for the years 1969 through 1975 is presented. The information is derived from reports submitted to the United States Nuclear Regulatory Commission in accordance with requirements of individual plant technical specifications. The MAN-REM/UNIT for all LWR's in 1975 is greater than the 1974 value. The cumulative average since 1969 continues to increase. No significant trend was indicated over the period of 1969-1975 in the mean value of MAN-REM/MEGAWATT-YEAR. GRA

N77-14741# Army Research Inst. of Environmental Medicine, Natick, Mass.

CURRENT APPROACHES TO RESOLVING THE PHYSIOLOGICAL HEAT STRESS PROBLEMS IMPOSED BY CHEMICAL PROTECTIVE CLOTHING SYSTEMS

Ralph F. Goldman and John R. Breckenridge 1976 7 p refs

(AD-A026003) Avail: NTIS HC A02/MF A01 CSCL 06/17

Possible improvements over totally impermeable chemical protective clothing for use in toxic environments have been characterized along three approaches: partially permeable garments impregnated with detoxifying or adsorbing substances; impermeable systems supplied with filtered ambient air ventilation; impermeable systems with wettable covers. Although the latter approach has much to recommend it, logistics of required water is a distinct problem. The only other alternatives, short of air conditioned clothing ensembles, is by intelligent informed command control of work-rest ratios, or actual replacement of units as they approach tolerance limits, during operations in environments above 75 F. Author (GRA)

N77-14742*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A WALKING BOOT ASSEMBLY Patent Application

Hubert C. Vykukal, Alan B. Chambers, and Roy H. StJohn, inventors (to NASA) Filed 23 Dec. 1976 17 p

(NASA-Case-ARC-11101-1; US-Patent-Appl-SN-753976) Avail: NTIS HC A02/MF A01 CSCL 05H

Spacers or liners inserted in the boot components of pressurized spacesuits impair foot ventilation and cause foot discomfort. A walking boot is described which includes a bootie adaptable to the foot of the wearer. A protuberance projected from the bootie fits within a recess in the inner sole of an hermetically sealed boot. Spring loaded latching bolts hold the bootie in place. Multiple wearers or astronauts with varying foot sizes can thus use a single spacesuit. NASA

N77-14743*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AN IMPROVED COOLING SYSTEM FOR REMOVING METABOLIC HEAT FROM AN HERMETICALLY SEALED SPACESUIT Patent Application

Bruce W. Webbon, Hubert C. Vykukal, and Bill A. Williams, inventors (to NASA) Filed 23 Dec. 1976 21 p

(NASA-Case-ARC-11059-1; US-Patent-Appl-SN-753978) Avail: NTIS HC A02/MF A01 CSCL 05H

A cooling and ventilating system is designed to achieve greater mobility with increased efficiency in removing metabolic heat, waste gases and water vapor from a spacesuit. The system includes an external life support system to which is attached a body suit with a liquid circulating circuit for establishing a cooling flow of water through the thorax and head sections of the body suit. A gas circulating circuit, including conduits and a helmet duct is provided for establishing a flow of gas throughout the spacesuit whereby gaseous wastes and water vapor are flushed from the suit. Heat, waste gases and water vapor ultimately are dissipated by the life support system. NASA

N77-14744# National Aeronautical Lab., Bangalore (India).

TIME DOMAIN AND TIME SERIES MODELS FOR HUMAN ACTIVITY IN COMPENSATORY TRACKING EXPERIMENTS

S. Balakrishna Mar. 1976 16 p refs

(Proj. IN-203)

(NAL-TN-50) Avail: NTIS HC A02/MF A01

Time domain modeling of human activity is investigated from compensatory tracking experiments invoking modern identification methodology. Various linear time invariant models in probabilistic situations are postulated to describe the pilot activity, and the associated problems of identification and estimation of these parametric models are detailed. Two classes of models are considered, an input-output based on a remanent term similar to quasi linear describing function models, and an innovative inaccessible input model based on concepts of time series analysis without remanent. Both classes of model are validated using experimentally generated data derived from a fixed base simulator. Author

N77-14745*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TWELFTH ANNUAL CONFERENCE ON MANUAL CONTROL

Thomas E. Wempe May 1976 1001 p refs Conf. held at Urbana, Ill., 25-27 May, 1976

(NASA-TM-X-73170; A-6762) Avail: NTIS HC A99/MF A01 CSCL 05E

Main topics discussed cover multi-task decision making, attention allocation and workload measurement, displays and controls, nonvisual displays, tracking and other psychomotor tasks, automobile driving, handling qualities and pilot ratings, remote manipulation, system identification, control models, and motion and visual cues. Sixty-five papers are included with presentations on results of analytical studies to develop and evaluate human operator models for a range of control task, vehicle dynamics and display situations; results of tests of physiological control systems and applications to medical problems; and on results of simulator and flight tests to determine display, control and dynamics effects on operator performance and workload for aircraft, automobile, and remote control systems. Author

N77-14746# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

HUMAN PERFORMANCE UNDER ACCELERATION: ACTUATION OF EJECTION SEAT LOWER FIRING CONTROL Final Report, 9 Dec. 1974 - 30 Jun. 1975

William P. Orrick, Jr., Phyllis E. York, and Malcolm M. Cohen 18 Mar. 1976 44 p

(AD-A025373; NADC-75268-40) Avail: NTIS HC A03/MF A01 CSCL 01/2

Sixteen male subjects attempted to actuate the lower firing control of an ejection seat using only the left hand while exposed to accelerations simulating several flight conditions. A human centrifuge was used to produce accelerations representative of level flight, dive recovery, dive recovery with buffet, cold catapult stroke, braking, inverted flight, spin and skid. In addition, fifty-four male and eight female subjects performed the task at 1 Gz, using three methods of gripping the firing control. Sample data and population estimates of pull forces for the various conditions are presented. Time data for task performance under acceleration and anthropometric data and force data are given. Author (GRA)

N77-14747# Air Force Human Resources Lab., Brooks AFB, Tex.
HUMAN RESOURCES AS ENGINEERING DESIGN CRITERIA
William B. Askren Mar. 1976 12 p refs
(AF Proj. 1124)
(AD-A024676; AFHRL-TR-76-1) Avail: NTIS HC A02/MF A01 CSCL 05/5

The results of a number of studies which have been performed in an attempt to develop a technology for using human resources data as criteria in engineering design studies are summarized. Eight investigations conducted during the period 1966-1975 are briefly described. The results of the eight studies are integrated around six topics feasibility and practicality of using human resources data as criteria in engineering design, methods for using the data in design studies, effect on the system of using the data as design criteria, types of human resources data most relevant for use as design criteria, methods for generating human resources data for use in design studies, and nature of the engineering design process. Author (GRA)

N77-14748# Air Force Human Resources Lab., Brooks AFB, Tex.
CONTINUATION VERSUS RECURRENT PILOT TRAINING Final Report, Nov. 1974 - Oct. 1975
James F. Smith and William G. Matheny (Life Sciences, Inc., Hurst, Texas) May 1976 14 p refs
(AD-A025846/7; AFHRL-TR-76-4) Avail: NTIS HC A02/MF A01 CSCL 05/9

Literature on the retention of motor, procedural and communication skills judged relevant to pilot training is surveyed. Also included are data concerning more recent pilot recurrent training information available from the United States Air Force, the United States Army and the Federal Aviation Agency. Implications of these data for USAF continuation pilot training are discussed, and an approach to obtaining more specific information is recommended. Author (GRA)

N77-14749# Pennsylvania State Univ., University Park. Environmental Acoustics Lab.
EVALUATION OF SPEECH PROCESSING SYSTEMS EVALUATION OF ELECTRONIC/ACTIVE HEARING PROTECTORS FOR USE IN UNDERGROUND COAL MINES Final Report
Paul L. Michael, James H. Prout, Gordon R. Bienvenue, Roger L. Kerlin, Sara Singer, George Kreick, and Anne Kohut May 1976 151 p refs
(Grant DI-BM-G0-155032)
(PB-256786/5; BM-OFR-96-76) Avail: NTIS HC A08/MF A01 CSCL 06Q

A discussion of performance parameters for electronic or active hearing protectors that will meet the needs of underground coal miners is presented. This information is incorporated into a proposed set of specifications that can be used to judge the suitability of a particular electronic hearing protector for the coal mine application. Acoustic and electrical tests were performed on a developmental model of an electronic hearing protector. A commercially active hearing protector, the British-built ACOS A-9000/2, was also examined. GRA

N77-14750# Naval Postgraduate School, Monterey, Calif.
PILOT REPORTED HUMAN FACTOR COCKPIT DISCREPANCIES IN NAVAL AIRCRAFT M.S. Thesis
Gene Leroy Daniels Mar. 1976 41 p refs
(AD-A026326) Avail: NTIS HC A03/MF A01 CSCL 01/3

This thesis investigates the problems in current naval aircraft cockpits as perceived by fleet naval aviators who are students at the U.S. Naval Aviation Safety School. A critical incident questionnaire provides data that examines the deficiencies of an individual aircraft. These individual aircraft deficiencies are then categorized into twelve major deficiency categories which are common to more than one aircraft. GRA

N77-15609 Michigan State Univ., East Lansing.
BLUE-GREEN ALGAL (ANABAENA FLOS-AQUAE) PROTEIN AS HUMAN FOOD Ph.D Thesis
Young Rack Choi 1976 154 p
Avail: Univ. Microfilms Order No. 76-27083

The blue-green algae Anabaena flos-aquae was grown at 32 C both in an autotrophic medium (control) without nitrogen and in a heterotrophic medium containing the following levels of additives: urea (0.01% w/v), $NaNO_3$ (0.01%), $NaNO_2$ (0.01%), peptone (0.05%), glucose (1%), and glucose plus urea (0.02% each). With glucose alone however, the blue-green algae showed good heterotrophic growth with increased yield. Changes in the concentration of glucose above or below 1% resulted in decreased yield. The theoretical yield and optimum harvesting rate of the cells were calculated on the basis of an equation from the growth curve. It was found that the green color of the algae was removed completely by illuminating with 15,064 lux fluorescent light for 8 hours at 32 C (algal suspension of 50 mg/100 ml). It was found that the highest yield of protein was obtained by the HCl-pretreatment method. Colorless and odorless protein could easily be obtained by photolyzing the protein extract after HCl-pretreatment. Dissert. Abstr.

N77-15610*# Scientific Translation Service, Santa Barbara, Calif.
STERILIZATION BY IONIZING RADIATION
M. J. Transy and J. Fleurette Jan. 1977 29 p refs Transl. into ENGLISH from Rev. D'Epidemiologie, Med. Sociale et Sante Publique (France), vol. 24, no. 2, 1976 p 165-184
(Contract NASw-2791)
(NASA-TT-F-17514) Avail: NTIS HC A03/MF A01 CSCL 06R

The general characteristics of ionizing radiation and their activity on microorganisms are summarized showing lethal and mutagenic effects, sensitivity conditions. Different microbial species have different sensitivities: gram negative bacteria are more sensitive (D10 approximately 5-10 Krads); bacterial spores and viruses are more resistant (D10 approximately 1 Megarads. The main applications of radiosterilization are considered showing some are in full development (medical and surgical disposal equipment); others are still at the experimental stage. Practical aspects, determination of sterilizing doses and control of radiosterilization are also described. Author

N77-15611# IIT Research Inst., Chicago, Ill.
SANGUINE/SEAFARER EXTREMELY LOW FREQUENCY ELECTROMAGNETIC FIELDS: EFFECT OF LONG-TERM EXPOSURE ON SOIL ARTHROPODS IN NATURE
Bernard Greenberg (Illinois Univ., Chicago) Jul. 1976 45 p refs
(Contract N00039-73-C-0030)
(AD-A027513) Avail: NTIS HC A03/MF A01 CSCL 06/18

A study of the long-term biological impact of extremely low frequency (ELF) non-ionizing electromagnetic radiation was continued at the Navy's Wisconsin Test Facility. Population analyses of soil arthropods and a floral survey were performed on nine exposed and six control plots. Comparisons with floral surveys taken three or four years earlier suggest normal vegetational changes and succession in exposed plots and environs. Phenomena observed in the exposed and control plots are of a shared nature and thus tend to exclude an ELF electromagnetic radiation effect. Data observed to date do not support the hypothesis that low-level non-ionizing ELF electromagnetic fields have had a demonstrable impact on populations of soil arthropods and surrounding flora after six years of exposure. Author (GRA)

N77-15612 California Univ., Los Angeles.
AN ANALYSIS OF BRAIN SYSTEMS INVOLVED IN INITIATION OF MOVEMENT Ph.D. Thesis
Edward Joseph Neafsey 1976 126 p
Avail: Univ. Microfilms Order No. 76-28574

The firing pattern of single units in the pericruciate cortex, globus pallidus, entopeduncular nucleus, and ventral thalamus of cats was studied before and during self-initiated limb

movements. The probable existence of two time-separated processes which are called set and go were examined. During the set process (defined temporally as neural activity preceding the bar pressing movement by more than 500 msec), the data indicates involvement of the globus pallidus, entopeduncular nucleus, ventrolateral-ventroanterior nuclei of the thalamus (VL-VA) and the pericruciate cortex medial to the end of the cruciate sulcus. Closer to the onset of the movement (defined by EMG activity as well as movement of the bar), the go process also involves the globus pallidus, entopeduncular nucleus, VL-VA, and medial pericruciate cortex but in addition particularly involves the pericruciate cortex lateral to the end of the cruciate sulcus. Dissert. Abstr.

N77-15613 Wisconsin Univ., Madison.
THE NEURAL CONTROL OF SKELETAL MUSCLE FIBER TYPE Ph.D. Thesis
Donald Harold Beerman 1976 164 p
Avail: Univ. Microfilms Order No. 76-20882

The strength and nature of the neural control of histochemical fiber type in porcine skeletal muscle were studied in normal adult semitendinosus, after experimental denervation and reinnervation, and in developing fetal porcine muscle. A combined silver and acetylcholinesterase method was developed for simultaneous staining of the axons and motor end plates in thick fresh frozen muscle sections. Denervation caused muscle fibers to become more homogeneous histochemically. Reinnervation occurred via extensive collateral branching of subterminal axons which gave rise to innervation of up to 15 muscle fibers by a single subterminal axon. Transformation of the histochemical profile of muscle fibers followed morphological reinnervation. A pattern of fiber type grouping unlike that observed in normal porcine muscle resulted from denervation and subsequent reinnervation. Dissert. Abstr.

N77-15614 Arizona Univ., Tucson.
NEUROTROPHIC CONTROL OF MAMMALIAN SKELETAL MUSCLE: THE ROLE OF SUBMECHANICAL THRESHOLD BIOELECTRIC ACTIVITY Ph.D. Thesis
Neal James Baumbach 1976 116 p
Avail: Univ. Microfilms Order No. 76-28224

The hypothesis that muscle bioelectric activity plays an important role in the long term maintenance of muscle was tested by electrically stimulating surgically and pharmacologically denervated muscles with submechanical threshold stimuli. Extensor digitorum longus (EDL) muscles of male Sprague-Dawley rats were used. The EDL muscles of one group of animals were surgically denervated by removal of a section of the deep peroneal nerve. The muscles were then wired at the tendons for chronic, submechanical threshold stimulation. One muscle of each animal was connected to a stimulator via a mercury-filled commutator and received continuous stimulation for 4 days. The contralateral, sham muscle received no stimulation. Both muscles from each animal were removed 1 hr after cessation of stimulation and mounted in a constant temperature chamber for isometric tension recordings. Dissert. Abstr.

N77-15615 Oklahoma Univ., Norman.
LOUDNESS AND THE ACOUSTIC REFLEX Ph.D. Thesis
Margaret Ann Wylde 1976 89 p
Avail: Univ. Microfilms Order No. 76-28133

The present experiment was designed to determine if bands of noise centered at 2000 Hz and varying in bandwidth from 1 to 6300 Hz are equally loud at reflex threshold in a sample of normal listeners. Two different approaches were used in an attempt to answer the experimental question. The first approach, the more direct measure, involved the determination of the relative loudness of stimuli at reflex threshold by loudness balancing each band of noise at reflex threshold level with a 200 Hz comparison sinusoid. If the bands were all equally loud at reflex threshold level it was expected that the SPL of the comparison signal would be constant. The second approach involved an indirect assessment of the relative loudness of stimuli at reflex threshold intensities by generating equal loudness contours by loudness balancing the noise bands which were varied in intensity with a 2000 Hz reference sinusoid at 70, 80, 90 and 100 dB SPL. Dissert. Abstr.

N77-15616 Wisconsin Univ., Madison.
MEASURING PUPILLARY AND VISUAL TEMPORAL FUNCTIONS USING A NEW PUPILLOMETER-STIMULATOR Ph.D. Thesis
Sherman Lee Heller 1976 151 p
Avail: Univ. Microfilms Order No. 76-20896

A pupillometer-eye tracking facility was developed to provide accurate measurements of pupillary diameter and to track pursuit and saccadic eye movements. The self-contained facility was linked to a SDS 930 computer for both control of test stimuli and analysis of data. The sensor was a non-storage image dissector tube which prevented smearing of the pupil image from inadevertent eye motion and permitted high speed eye movement tracking. Pupil diameter accuracy was about 0.05 mm with a frequency response of 15 Hz. Eye movement frequency response was about 60 Hz (updated approximately every 8 ms) with an accuracy of 1/2 deg over a 20 deg field of view. Normal saccadic eye movements of 30 to 40 ms duration were easily followed. For investigating the temporal characteristics of visual perception or the pupillary light reflex, flexible, accurate, and stable light stimulator was developed. Dissert. Abstr.

N77-15617*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
MAGNETIC ELECTRICAL CONNECTORS FOR BIOMEDICAL PERCUTANEOUS IMPLANTS Patent Application
Lester J. Owens, inventor (to NASA) Filed 30 Jul. 1976 14 p
(NASA-Case-KSC-11030-1; US-Patent-Appl-SN-709849) Avail: NTIS HC A02/MF A01 CSCL 06B

A biomedical percutaneous connector for providing electrical connection between electrical conductors carried externally of a patient's body, and electrical conductors implanted within the body of the patient is described. The connector includes a socket having an enlarged disk shaped base portion for being implanted below the patient's skin. A cylindrical portion is integral with the base portion and extends outwardly of the skin. A conical recess is provided in a upper end of the cylindrical portion and has a magnet located in the base. Inclined conductive strips are carried on an upper end of the cylindrical portion adjacent the conical recess to which electrical conductors are attached and extend into the patient's body. A complementary shaped plug which also has electrical contacts provided is adaped to fit within the conical recess of the socket. NASA

N77-15618*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
ROTATIONAL JOINT FOR THE PROSTHETIC LEG Patent Application
Lester J. Owens and William C. Jones, inventors (to NASA) Filed 30 Jul. 1976 14 p
(NASA-Case-KSC-11004-1; US-Patent-Appl-SN-710032) Avail: NTIS HC A02/MF A01 CSCL 06B

A rotational joint assembly for a prosthetic leg which enables an artificial foot to rotate slighly when a person is walking, running or turning is described. The prosthetic leg includes upper and lower tubular members with the rotational joint assembly interposed therebetween. The rotational joint assembly includes a restrainer mechanism which consists of a pivotably mounted paddle element engaging a resilient device for applying a limiting force to control the rotation of the foot and also restoring torque to return the foot back to its initial position. NASA

N77-15619*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EKG AND ULTRASONOSCOPE DISPLAY Patent Application
Robert D. Lee, inventor (to NASA) Filed 17 Jan. 1977 21 p
(NASA-Case-ARC-10994-2; US-Patent-Appl-SN-759965) Avail: NTIS HC A02/MF A01 CSCL 06B

A system is disclosed which permits simultaneous display of an EKG waveform in real time in conjunction with a two dimensional cross sectional image of the heart, so that the EKG waveform can be directly compared with dimensional changes in the heart. The apparatus of the invention includes an ultrasonoscope for producing a C-scan cross-sectional image of the heart. An EKG monitor circuit along with EKG logic circuitry is combined with the ultrasonoscope circuitry to produce on the same oscilloscope screen a continuous vertical trace showing the EKG waveform simultaneously with the heart image. The logic circuitry controls the oscilloscope display such that the display of both heart and EKG waveforms occurs on a real time basis. NASA

N77-15620*# Texas Technological Univ., Lubbock. School of Medicine.
INTERNATIONAL CONFERENCE ON REMOTE EMERGENCY MEDICAL SERVICES
15 May 1975 198 p refs Conf. held at Lubbock, Tex., 15-17 May 1975
(Contract NAS9-14438)
(NASA-CR-151154) Avail: NTIS HC A09/MF A01 CSCL 06E

An emergency medical system is characterized. Applications of NASA technology in biomedical telecommunication and bioinstrumentation are explored. The training and effectiveness of paramedics, technicians, nurses, and physicians are evaluated as applied to emergency situations and the operations of trauma centers. Civilian and military aeromedical evacuation is discussed. A.H.

N77-15621*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A MINIATURE IMPLANTABLE ULTRASONIC ECHOSONOMETER Patent Application
Gilbert K. Kojima, inventor (to NASA) Filed 12 Jan. 1977 14 p
(NASA-Case-ARC-11035-1; US-Patent-Appl-SN-758721) Avail: NTIS HC A02/MF A01 CSCL 06B

A miniature echosonometer adapted for implantation in the interior of an animal for imaging the internal structure of an organ, tissue or vessel is described. The echosonometer includes a receiver/transmitter circuit which is coupled to an ultrasonic transducer. Power is coupled to the echosonometer by electromagnetic induction through the animal's skin. Imaging signals from the echosonometer are electronmagnetically transmitted through the animal's skin to an external readout apparatus. NASA

N77-15622# Mayo Foundation, Rochester, Minn. Dept. of Physiology and Biophysics.
PROTECTION OF THE CARDIOPULMONARY SYSTEMS AGAINST THE INJURIOUS EFFECTS OF ACCELERATION Annual Progress Report, 1 Jul. 1974 - 30 Jun. 1976
Peter A. Chevalier Jun. 1975 37 p refs
(Contract F44620-71-C-0069; AF Proj. 6813)
(AD-A027715; AFOSR-76-0689TR) Avail: NTIS HC A03/MF A01 CSCL 06/19

Research accomplished during the period centered primarily on the application of recently developed pulmonary parenchymal markers and three-dimensional transaxial reconstruction techniques to the study of the spatial distribution of lung parenchymal strains, regional lung volumes and lung geometry. The development of these marker techniques provide a unique research tool. The data described in this report represent significant new information regarding regional mechanical properties of the lung and clearly indicate the need to study the intrinsic elastic behavior in order to quantitate dynamic changes. GRA

N77-15623# Office of Naval Research, London (England).
WORKSHOP ON THE TREATMENT OF DECOMPRESSION SICKNESS
K. M. Greene 12 Jul. 1976 9 p Workshop held at London, 17-18 Feb. 1976
(AD-A027626; ONRL-C-18-76) Avail: NTIS HC A02/MF A01 CSCL 06/19

This report summarizes a workshop held 17-18 February 1976 in London. The thirty physicians attending from seven nations sought a uniform approach to the treatment of decompression sickness in the North Sea environment. Aspects considered include recompression profiles, gas mixtures, ancillary drugs, aftercare, qualification of assistants, and communication problems. Included in the report is an outline approved by the EUBS for guidance in the choice of treatment tables. Author (GRA)

N77-15624# Hawaii Univ., Honolulu. Dept. of Physiology.
QUANTIFICATION OF HEAT LOSS FROM VARIOUS ROUTES IN MAN DWELLING IN A WET/DRY HYPERBARIC ENVIRONMENT Ph.D. Thesis. Final Report, 1 May 1972 - 31 Aug. 1975
Terence O. Moore and James F. Morlock 1 Jun. 1976 217 p refs
(Contract N00014-67-A-0387-0016; NR Proj. 101-941)
(AD-A027592) Avail: NTIS HC A10/MF A01 CSCL 06/19

Respiratory and whole body heat losses have been quantified and predictive equations have been derived for diving conditions of depth, gas density, gas mix, ambient and immersion water temperatures, and work levels. GRA

N77-15625# Army Materiel Command, Texarkana, Tex. Intern Training Center.
A STUDY OF THE EFFECT OF CONTROLLED EXERCISE ON PERFORMANCE DURING STRESSFUL CONDITIONS Final Report
Kenneth E. Moseley Dec. 1975 47 p refs Prepared in cooperation with Texas A and M Univ., Texarkana
(AD-A026350; USAMC-ITC-02-08-76-419) Avail: NTIS HC A03/MF A01 CSCL 06/19

This paper reports the results of an experiment designed to prove or disprove the theory that controlled exercise during extreme stress could significantly reduce fatigue. The nature of mental fatigue is thoroughly discussed as well as many of the factors which cause this condition. The experiment was constructed from a statistics final examination. Two statistics classes were divided into three randomized sections, each receiving a different activity treatment level. Section three was given a seven minute exercise period, Section two was given a seven minute rest period, and Section one was given no rest and immediately began work on the second portion of the exam. Analytical results showed no difference in the mean scores of the three sections. This leads to the conclusion that controlled exercise does not have an effect on performance. A discussion of 'blocking' is presented as an explanation of the results. Experimental design and related topics are presented for further research. Author (GRA)

N77-15626# Army Materiel Command, Texarkana, Tex. Intern Training Center.
USE OF KIRLIAN PHOTOGRAPHY IN FATIGUE ASSESSMENT Final Report
C. Thomas Reeves Dec. 1975 59 p refs
(AD-A026349; USAMC-ITC-02-06-76-403) Avail: NTIS HC A04/MF A01 CSCL 06/19

In this research, assessment of fatigue by using Kirlian photography was investigated. Both mental and physical fatigue were included in the study. The mental stressor used was engineering graduate school class lectures; the physical stressor was softball games played under hot, humid atmospheric conditions. The photograph parameter used to indicate fatigue was the fingertip's corona diameter. A Wilcoxon signed rank

test at the 0.99 level of significance determined statistically significant corona diameter changes did occur in both cases. The diameter significantly increased after applying the physical stressor and decreased after applying the mental stressor.
Author (GRA)

N77-15627# Edgewood Arsenal, Aberdeen Proving Ground, Md.
CHOLINERGIC SYSTEMS IN BRAIN MEDIATING THERMOREGULATORY FUNCTION: A REVIEW
Thomas A. Rudy and Tony L. Yaksh Jun. 1976 36 p refs
(DA Proj. 1W7-62718-AD-21)
(AD-A026948; EB-SP-76014) Avail: NTIS HC A03/MF A01 CSCL 06/16

The report consists of a comprehensive review of the literature pertaining to the involvement in thermoregulatory function of cholinergic systems in the brain. The literature surveyed includes that published prior to November 1974. The review is organized into subsections, each devoted to data derived from a particular mammalian species (mouse, rat, cat, rabbit, goat, sheep, rhesus monkey, man). Emphasis is placed upon evidence arising from use of the intracerebro-ventricular and intracerebral routes of drug administration, although results based on the systemic administration of centrally active modifiers of cholinergic function are also considered. The experimental findings discussed most extensively are those illustrating cholinergically mediated effects on deep body temperature, on the 'setpoint' for thermoregulation, and on the state of activation of individual peripheral effector mechanisms mediating heat gain and heat loss. GRA

N77-15628# Mount Sinai Medical Center, Miami Beach, Fla. Div. of Pulmonary Diseases.
DETECTION AND PREVENTION OF G-INDUCED REGIONAL ATELECTASIS, EDEMA, AND HYPOPERFUSION Final Report, Oct. 1971 - Oct. 1973
Marvin A. Sackner and Adam Wanner Dec. 1975 268 p refs
(Contract F41609-72-C-0004; AF Proj. 7930)
(AD-A026238; SAM-TR-75-25) Avail: NTIS HC A12/MF A01 CSCL 06/19

These investigations were concerned with the evaluation of pulmonary circulation and the distribution of ventilation in response to maneuvering acceleration. In order to study the response of -Gz protection by the anti-G suit, respiratory maneuvers, and pharmacologic agents, it was necessary to improve existing methods and to develop new ones--both in anesthetized dogs and in human volunteers. To standardize noninvasive tests of the pulmonary circulation and distribution of ventilation, invasive studies were necessarily performed on anesthetized animals for comparison. One of the studies which dealt with the action of anti-G suits led to the hypothesis that anti-G suits would be more efficient if they inflated from below, upward (rather than from the abdominal bladder, downward, as in the standard USAF anti-G suit). GRA

N77-15629# Union Carbide Corp., Bound Brook, N.J. Dept. of Chemicals and Plastics.
MICROFIBER MATERIALS FOR GROWTH OF INTIMAL LININGS IN CIRCULATORY ASSIST DEVICES Annual Technical Progress Report, Jun. 1975 - Mar. 1976
William F. Beach and Frederick R. Tittmann 30 Mar. 1976 25 p refs
(Contract N01-HV-1388)
(PB-257846/6; NIH-N01-HV-8-1388-A5) Avail: NTIS HC A02/MF A01 CSCL 06L

Research efforts on the development of microfiber scaffolding for the in-growth of neointimal tissue to achieve blood compatibility with the internal surfaces of circulatory assist device parts are presented. The production of microfiber lined Tecothane axisymmetric Model X blood pump bladders, for use by evaluators is studied. While the principal bladder lining approach has continued to involve eversion and the use of an additional adhesive, it was necessary to develop a microfiber lining type, as it was realized that type E would not promote a suitable level of cellular adhesion of the neointimal tissue. GRA

N77-15630# Union Carbide Corp., Bound Brook, N.J. Dept. of Research and Development.
DEVELOPMENT OF IMPROVED MATERIALS FOR EXTRAORAL MAXILLOFACIAL PROSTHESIS Comprehensive Annual Technical Report, 1 Jun. 1975 - 1 Jun. 1976
Lloyd M. Robeson, Winfred J. Saunders, and Markus Matzner Jun. 1976 48 p refs
(Contract N01-DE-42436)
(PB-257860/7; NIDR/CR-76/10; CATR-1) Avail: NTIS HC A03/MF A01 CSCL 06L

The development of improved materials for extraoral maxillofacial prosthesis is reported. Fabrication problems were observed and studied. Vacuum molding and emulsion casting techniques were developed but were found to be inferior to solution casting techniques. The composite of C-4 polycarbonate/silicone rubber prosthesis skins with silicone rubber foam as the interior yielded lightweight tough prosthesis. Relative to RTV silicone rubber, the fabrication route for the product defined is considerably more difficult, and shrinkage problems exist with larger moldings. The fabrication difficulty was considered serious enough such that clinical evaluations were not initiated. Color illustrations are reproduced in black and white. GRA

N77-15631# Thermo Electron Corp., Waltham, Mass.
VAPOR CYCLE ENERGY SYSTEM FOR IMPLANTABLE CIRCULATORY ASSIST DEVICES Annual Progress Report, Jul. 1975 - May 1976
R. P. Watelet, A. E. Ruggles, and K. G. Hagen May 1976 294 p refs
(Contract N01-HV-4-2909)
(PB-257751/8; TE-4182-94-76; NIH-N01-HV-4-2909-3) Avail: NTIS HC A13/MF A01 CSCL 06L

The development status of a heart assist system driven by a nuclear fueled, electronically controlled vapor cycle engine termed the tidal regenerator engine (TRE) was described. The TRE pressurization was controlled by a torque motor coupled to a displacer. The electrical power for the sensor, electronic logic and actuator was provided by thermoelectric modules interposed between the engine superheater and boiler. The TRE was direct coupled to an assist blood pump which also acted as a blood-cooled heat exchanger, pressure-volume transformer and sensor for the electronic logic. Engine cycle efficiency in excess of 14 % was demonstrated routinely. GRA

N77-15632# Thermo Electron Corp., Waltham, Mass.
FABRICATION OF IMPLANTABLE ARTIFICIAL HEART DEVICES AND COMPONENTS Annual Technical Progress Report, Apr. 1975 - Mar. 1976
J. Keiser and V. Poirier Mar. 1976 44 p
(Contract N01-HV-1-2065)
(PB-257845/8; TE-4143-78-76; NIH/NHLI-71-2065-5) Avail: NTIS HC A03/MF A01 CSCL 06L

During the past year, axisymmetric blood pumps, pusher plate pumps, pump control systems and mock circulatory loop components were fabricated. Fabrication and test of a standardized mock circulatory loop was carried out; this system provides a standard circulatory analog for comparative testing of assist pumps and related devices. It includes a mock ventricle which simulates the natural heart function allowing for dynamic analysis of device performance. GRA

N77-15633# Southern Research Inst., Birmingham, Ala.
DEVELOPMENT OF IMPROVED MATERIALS FOR EXTRAORAL MAXILLOFACIAL PROSTHESES Annual Technical Report No. 2, 15 May 1975 - 15 May 1976
Danny H. Lewis, David R. Miller, and Donald R. Cowsar Jun. 1976 48 p refs
(Contract N01-DE-42435)
(PB-258002/5; SORI-EAS-76-251; NIDR/CR-76/11) Avail: NTIS HC A03/MF A01 CSCL 06L

An improved elastomer with an optimum balance of mechanical properties, processability, environmental stability,

colorability, and esthetics, for use in fabricating extraoral maxillofacial prostheses, was sought. An arylene silicone polymer polytetramethylsilphenylene-siloxanedimethylsiloxane was synthesized and formulated as a pourable, viscous, room-temperature-vulcanizing liquid. GRA

N77-15634# Office of Radiation Programs, Washington, D.C. Environmental Analysis Div.
A MEASUREMENT OF RF FIELD INTENSITIES IN THE IMMEDIATE VICINITY OF AN FM BROADCAST STATION ANTENNA
R. A. Tell Jan. 1976 13 p refs Sponsored by EPA
(PB-257698/1; ORP/EAD-76-2) Avail: NTIS HC A02/MF A01 CSCL 06R

An FM broadcast tower was surveyed to determine the radiofrequency exposure levels to which personnel working on such towers would be exposed during such tasks as painting, beacon replacement, repairs to de-icing equipment, antenna adjustment, and tower rigging and replacement. High intensity radiofrequency fields in excess of 180 mW/SQ cm were found on the tower. To prevent a worker's exposure from exceeding OSHA standards, he would be allowed to work in this field only 20 seconds in each 6 minute period. Since this is impractical, it was suggested that tower work be performed only when the transmitter is turned off. GRA

N77-15635# Nuclear Regulatory Commission, Washington, D.C. Office of Standards Development.
MANUAL OF RESPIRATORY PROTECTION AGAINST AIRBORNE RADIOACTIVE MATERIALS Final Report
Jerrold L. Caplin , Bruce J. Held , Robert J. Catlin , Darell A. Bevis (Los Alamos Sci. Lab., N. Mex.), Evan Campbell (Los Alamos Sci. Lab., N. Mex.), Harry J. Ettinger (Los Alamos Sci. Lab., N. Mex.), Louis A. Geoffrion (Los Alamos Sci. Lab., N. Mex.), Alan L. Hack (Los Alamos Sci. Lab., N. Mex.), Edwin C. Hyatt (Los Alamos Sci. Lab., N. Mex.), John C. Pritchard (Los Alamos Sci. Lab., N. Mex.) et al Oct. 1976 147 p refs
(PB-258052/0; NUREG-0041) Avail: NTIS HC A07/MF A01 CSCL 06Q

The manual provides broad guidance for the planned use of respirators to protect individuals from airborne radioactive materials that might be encountered during certain operations. The guidance is intended for use by management in establishing and supervising programs and by operating personnel in implementing programs. Guidance is primarily directed to the use of respirators to prevent the inhalation of airborne radioactive materials. Author

N77-15636# McDonnell-Douglas Astronautics Co., Richland, Wash. Energy Lab.
IMPLANTED ENERGY CONVERSION SYSTEM Annual Report, 1 May 1975 - 1 Jun. 1976
R. P. Johnston, L. P. Bakker, A. Bennett, C. R. Blair, S. G. Emigh, G. M. Eglesby, D. H. Gray, W. R. Griffith, J. E. Noble, J. F. Oster et al Aug. 1976 255 p refs
(Contract N01-HV-4-2901)
(PB-257888/8; MDC-G4448; NIH-N01-HV-4-2901-3) Avail: NTIS HC A12/MF A01 CSCL 06L

The heart power source combines the high efficiency of Stirling engines with the reliability, efficiency, and flexibility of hydraulic power transfer and control to ensure long system life and physiological effectiveness. Extended life testing was achieved with an engine (1.57 years) and hydraulic actuator/controller (1.07 years) in continuing tests without failure. Animal in-vivo tests with an assist heart consistently demonstrated required performance by biological synchronization and effective ventricle relief. Carefully planned development of System 6 produced major reductions in required input power and size. Author

N77-15637*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
WHY MAN EXPLORES
1976 44 p refs Symp. held at Pasadena, Calif., 2 Jul. 1976
(NASA-EP-125) Avail: NTIS HC A03/MF A01 CSCL 05J

This NASA Educational Publication was prepared from a transcript of a panel discussion held on July 2, 1976, in conjunction with the Viking Missions to Mars. The members of the Why Man Explores panel were selected as authorities in classical disciplines relating to exploration. Author

N77-15638# Oregon Univ., Eugene. Dept. of Psychology.
CODING SYSTEMS AND THE COMPREHENSION OF INSTRUCTIONAL MATERIALS Semiannual, Technical Report, 1 Nov. 1974 - 30 Apr. 1975
Ray Hyman Apr. 1975 47 p refs
(Contract F44620-73-C-0056; ARPA Order 2448; AF Proj. 6813)
(AD-A026361; AFOSR-76-0180TR) Avail: NTIS HC A03/MF A01 CSCL 05/10

This research continues earlier studies of how learners encode information for storage in memory and the effect of the encoding process on retrieval from memory storage. Current research is extending the investigation to the storage and recovery of semantic (meaningful) information rather than unrelated units of information. The writer and his associates are working on the process of 'chunking' information into units as an influence on memory. They are also investigating the differences in encoding that characterize sophisticated learners as compared to novice in a subject matter field; and they are performing studies of memory in the mode of classical and semantic memory formulations. GRA

N77-15639# Air Force Human Resources Lab., Brooks AFB, Tex.
COGNITIVE PRETRAINING OF THE T-37 OVERHEAD TRAFFIC PATTERN Final Report, May 1974 - Jun. 1975
Bruce A. Smith, Brian K. Waters, and Bernell J. Edwards Dec. 1975 55 p refs
(AF Proj. 1123)
(AD-A026118; AFHRL-TR-75-72) Avail: NTIS HC A04/MF A01 CSCL 05/9

This study investigated the utility of a cognitive pretraining instructional package to the training of the T-37 overhead traffic pattern used in Air Force undergraduate pilot training (UPT). A multi-media package was prepared following instructional systems development (ISD) procedures. The package included a programmed text, sound/slide briefing, 8mm motion picture sequence and a 49 item multiple-choice criterion measure. Instructional material was validated using three UPT classes at Williams AFB, Arizona. An evaluation of the effectiveness of the instructional package was performed using two student sections from class 76-05 (n=15 each) as experimental (E) and control (C) groups. Criterion test scores and inflight T-37 instructor pilot rated performance were used as dependent variables. Results showed consistent, significantly better student performance on all measures by E, particularly in early training. Overall, the instructional program significantly improved the student pilot's recognition of critical cues, increased student knowledge, confidence, and coordination as rated by the instructor pilots, and resulted in an average of two less flights per subject to attain criterion performance on the task. The authors recommend implementation of the cognitive pretraining package into the UPT curriculum throughout Air Training Command (ATC) and that ATC apply the concept of cognitive pretraining in the development of curriculum to train other complex psychomotor tasks. The technique appears to be both efficient and cost-effective.
Author (GRA)

N77-15640# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
HUMAN FACTORS OF DOT MATRIX DISPLAYS Final Technical Report, Feb. 1973 - Oct. 1974

Gregory L. Peters and Terry M. Riley (Bunker-Ramo Corp., Silver Spring, Md.) Feb. 1976 82 p
(AF Proj. 2020)
(AD-A026244; AFFDL-TR-75-48) Avail: NTIS HC A04/MF A01 CSCL 05/5

The document presents a series of reports given at a meeting on the Human Factors of Dot Matrix Displays held at the Flight Dynamics Laboratory. The main presentations were intermediate reports by two prime contractors performing dot matrix legibility studies and a third primary contractor constructing a Light Emitting Diode (LED) display simulator. Reports of several in-house activities were also given by Flight Dynamics Laboratory, Aerospace Medical Research Laboratory and Army Electronics Command personnel. Author (GRA)

N77-15641*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SPACESUIT MOBILITY JOINTS Patent Application
Hubert C. Vykukal, inventor (to NASA) Filed 23 Dec. 1976 47 p
(NASA-Case-ARC-11058-1; US-Patent-Appl-SN-753965) Avail: NTIS HC A02/MF A01 CSCL 05H

Constant volume mobility joints are described for interconnecting adjacent segments of an hermetically sealed spacesuit for relative motion. Each joint includes at least one pair of annuli supported for pivotal displacement about paralleling axes and a flexible, substantially impermeable diaphragm of a tubular configuration spanning the distance between the annuli and connected thereto in an hermetically sealed relationship therewith. The diaphragm includes at least one rolling convolution having a crown disposed in a fixed relation with an axis about which one of the annuli pivots. NASA

N77-15642*# Kanner (Leo) Associates, Redwood City, Calif.
A NEW HEAD-UP CONTROL DISPLAY: MEDICO-PHYSIOLOGICAL CONSIDERATIONS
J. Lavernhe Washington NASA Jan. 1977 19 p Transl. into ENGLISH from Revue de Medecine Aeronautique et Spatiale (France), no. 53, 1975 p 37-43
(Contract NASw-2790)
(NASA-TT-F-17387) Avail: NTIS HC A02/MF A01 CSCL 05E

The advantages of a head up flight control display with speed vector are discussed, particularly with regard to the time saved because of the fewer number of flight parameters involved in the maneuvers considered (approach and landing) and because the display obviates the need for constant sequential monitoring of the instrument panel. Author

N77-15643*# Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
HOLLOW FIBER MEMBRANE SYSTEMS FOR ADVANCED LIFE SUPPORT SYSTEMS Final Report
George J. Roebelen, Jr. and Michael J. Lysaght Oct. 1976 255 p refs
(Contract NAS9-14682)
(NASA-CR-151149; SVHSER-7100) Avail: NTIS HC A12/MF A01 CSCL 06K

The practicability of utilizing hollow fiber membranes in vehicular and portable life support system applications is described. A preliminary screening of potential advanced life support applications resulted in the selection of five applications for feasibility study and testing. As a result of the feasibility study and testing, three applications, heat rejection, deaeration, and bacteria filtration, were chosen for breadboard development testing; breadboard hardware was manufactured and tested, and the physical properties of the hollow fiber membrane assemblies are characterized. Author

N77-15644*# Martin Marietta Corp., Denver, Colo.
A TRADEOFF STUDY TO DETERMINE THE OPTIMUM APPROACH TO A WASH/RINSE CAPABILITY TO SUPPORT FUTURE SPACE FLIGHT Final Report
D. A. Wilson Dec. 1976 194 p refs
(Contract NAS9-15102)
(NASA-CR-151155; MCR-76-561; DRL-T-1302; DRD-MA-646T) Avail: NTIS CSCL 06K

Specific requirements for a wash/rinse capability to support Spacelab biological experimentation and to identify various concepts for achieving this capability were determined. This included the examination of current state-of-the-art and emerging technology designs that would meet the wash/rinse requirements. Once several concepts were identified, including the disposable utensils, tools and gloves or other possible alternatives, a tradeoff analysis involving system cost, weight, volume utilization, functional performance, maintainability, reliability, power utilization, safety, complexity, etc., was performed so as to determine an optimum approach for achieving a wash/rinse capability to support future space flights. Missions of varying crew size and durations were considered. Author

N77-15645*# Minnesota Univ., St. Paul. Dept. of Food Service and Nutrition.
STORAGE STABILITY AND IMPROVEMENT OF INTERMEDIATE MOISTURE FOODS, PHASE 4 Final Report, Sep. 1975 - Sep. 1976
Theodore P. Labuza Sep. 1976 385 p refs
(Contract NAS9-12560)
(NASA-CR-151147) Avail: NTIS HC A17/MF A01 CSCL 06H

Shelf life tests are used to estimate the rate of nonenzymatic browning; however, controlling the reducing sugar levels below 23:1 molar ratio to amines, slows the rate. In addition, liquid glycols surpress browning. The protozoan Tetrahymena pyriformis W can be used to estimate nutrition losses during browning. At high temperatures (80 to 120 C) used in processing intermediate moisture foods (IMF), vitamin C destruction shifts to a zero order mechanism. BHA and BHT are the most effective antioxidants against rancidity. In shelf life testing however, 45 C should be the maximum temperature used. Water binding agents are studied. The five isotherms of thirteen humectants were determined. The results show that neither the method of addition nor sequence of addition affects the a sub u lowering ability of these humectants. Results were used to formulate shelf stable IMF processed cheese foods with at least four months shelf life. Author

N77-15646# Alberta Univ., Edmonton.
ANALYSIS OF MULTIPLE FREQUENCY FOOD PROCESSING SYSTEM Final Report, Dec. 1973 - Dec. 1974
W. R. Tinga 31 Oct. 1975 31 p refs
(Grant DAHC04-74-G-0075)
(AD-A026768; ARO-12109.1-EL) Avail: NTIS HC A03/MF A01 CSCL 06/8

A model is described for predicting temperature profiles in materials heated by microwave power at 2450 MHz and 915 MHz. Theoretical and some experimental data are given to show that internal temperatures in cylinders and spheres exposed to microwaves from all sides are considerably higher than the surface temperatures of the materials. The time dependent three-dimensional heat conduction equation including an internal heat generation term is solved for parallel slabs and infinite cylinders. GRA

N77-15647# School of Aerospace Medicine, Brooks AFB, Tex.
BIOMEDICAL ASPECTS OF OXYGEN REGULATOR PERFORMANCE. 2: DYNAMIC CHARACTERISTICS Report, 1 Jan. - 1 Aug. 1975
Paul J. Zalesky, Ronald D. Holden, and Bruce F. Hiott 1 Aug. 1975 10 p refs
(AF Proj. 7164)
(AD-A026504; SAM-TR-75-368) Avail: NTIS HC A02/MF A01 CSCL 06/11

Several oxygen regulators were quantitatively assessed during interface with dynamic respiratory simulation and human user breathing. Continuous measurements of regulator flow, delivered

pressure, and delivered oxygenation were provided during variable tidal volumes and breathing frequencies as accomplished initially with breathing simulation and subsequently with human users. The regulators demonstrated large sensitivity to flow demand and the characteristics of the inspiratory flow pulse. Large variations in outlet suction pressure and delivered oxygen concentration accompanied the variable breathing modes of human subjects. The inability of oxygen regulators to consistently provide required oxygen/air delivery is discussed with respect to inadequate performance specifications currently used.
Author (GRA)

N77-15648# School of Aerospace Medicine, Brooks AFB, Tex.
A PORTABLE OXYGEN SYSTEM FOR AEROMEDICAL CREWMEMBERS. AN EVALUATION Interim Report, Jan. - Jun. 1975
Thomas R. Morgan Apr. 1976 14 p refs
(AF Proj. 7164)
(AD-A027373; SAM-TR-76-2) Avail: NTIS HC A02/MF A01 CSCL 06/11

An emergency portable oxygen system for aeromedical crewmembers was subjected to a series of manned human compatibility tests. Test conditions included decompression to a simulated cabin altitude of 40,000 feet, with subsequent emergency descent and continuation at 25,000 feet until the system's chlorate-candle oxygen generator was exhausted. Test subjects were satisfactorily oxygenated in all cases, and the unit's external-surface and product-gas temperatures remained acceptable throughout each test. After use, however, each unit experienced melting/failure of the oxygen-mask hose at its junction with the candle assembly's oxygen-delivery tube. A modification rectifying this tendency was derived and satisfactorily tested in subsequent experiments. Problems and advantages inherent to the system's function are discussed in the light of both physiological and anticipated operational effectiveness.
Author (GRA)

N77-15649# Woods Hole Oceanographic Institution, Mass.
DESCRIPTION OF AN EXPERIMENTAL UNDERSEA MANIPULATOR SYSTEM WITH FORCE FEEDBACK Technical Report, Nov. 1974 - Nov. 1975
W. R. Bertsche, A. J. Pesch, and C. L. Winget May 1976 33 p
(Contract N00014-74-C-0179; NR Proj. 196-131)
(AD-A027436; WHOI-TM-2-76) Avail: NTIS HC A03/MF A01 CSCL 13/9

The report describes an experimental undersea manipulator system with force feedback capability. The basic system includes the means for providing alternate forms of force feedback: information to the operator, with the installation designed to simulate the undersea operating conditions of a small manned submersible.
Author (GRA)

N77-15650# Woods Hole Oceanographic Institution, Mass.
POTENTIAL DESIGN ALTERNATIVES AND ANALYSIS OF SYSTEM RESPONSE VARIABLES, CHARACTERISTIC OF UNDERSEA MANIPULATORS WITH FORCE FEEDBACK
W. R. Bertsche, A. J. Pesch, and C. L. Winget May 1976 70 p refs
(Contract N00014-74-C-0179; NR Proj. 196-131)
(AD-A027435; WHOI-TM-1-76) Avail: NTIS HC A04/MF A01 CSCL 13/9

This report concerns the examination of the engineering features which affect force feedback design and fidelity in undersea manipulators. The findings obtained from the test program provided the basis on which a series of engineering test procedures were established for use in evaluation undersea manipulators, including a set of basic definitions concerning each of the variables being measured.
Author (GRA)

N77-15651# Naval Medical Research Inst., Bethesda, Md.
ENERGY, PROTEIN, MINERAL AND WATER CONTENT OF FOOD ITEMS Medical Research Progress Report
V. Frattali, M. Quesada, and R. Robertson Apr. 1976 25 p refs
(AD-A026756; PR-8) Avail: NTIS HC A02/MF A01 CSCL 06/8

Methods used to determine the energy, protein, mineral, and water content of prepared food items that composed the diet for five divers involved in a biomedical study lasting 30 days which included nutrition in a high pressure helium-oxygen environment are described. Moisture content of food items was determined by a gravimetric procedure, energy by oxygen bomb calorimetry, nitrogen by a semimicro Kjeldahl procedure, and sodium and potassium by atomic absorption spectrophotometry. Approximately 300 food items were analyzed in order to calculate the energy, protein, mineral and water intake for the hyperbaric nutrition balance study.
GRA

N77-15652# Clarkson Coll. of Technology, Potsdam, N.Y. Dept of Mechanical and Industrial Engineering.
AN IMPROVED HUMAN DISPLAY MODEL FOR OCCUPANT CRASH SIMULATION PROGRAMS Technical Report, Jul 1975 - Jun. 1976
K. D. Willmert and T. E. Potter (Xerox Corp., Webster, N. Y.) Apr. 1976 24 p refs
(Contract N00014-76-C-0064; NR Proj. 064-548)
(AD-A026719; MIE-018) Avail: NTIS HC A02/MF A01 CSCL 09/2

Presented is an improved three-dimensional display model of a human being which can be used to display the results of three-dimensional simulation programs that predict the positions of an occupant during impact of a vehicle. The model allows the user to view the occupant from any orientation in any position during the crash. The display model assumes the usual break up of the body into rigid segments which is normal for occupant crash simulation programs, but the shape of the segments in the display model are not necessarily the same as those used in the crash simulation. The display model is proportioned so as to produce a realistic drawing of the human body in any position. Joints connecting the segments are also drawn to improve realism.
Author (GRA)

N77-15653# Navy Clothing and Textile Research Unit, Natick, Mass.
ALUMINIZED FIREMEN'S (FIRE PROXIMITY) HANDWEAR: A COMPARATIVE STUDY OF DEXTERITY CHARACTERISTICS Technical Report, Nov. 1975 - Jun. 1976
Francis S. Andruk, James C. Shampine, and Dale A. Reins Jul. 1976 25 p refs
(AD-A027211; DOD-AGFSRS-76-17; TR-121/5-76) Avail: NTIS HC A02/MF A01 CSCL 06/17

A comparative study of the tactility and dexterity characteristics of several configurations of aluminized firemen's (fire proximity) handwear was conducted. The old standard aluminized firemen's glove was compared with that of the recently adopted two component (glove shell and glove insert) standard and a newly developed experimental prototype, which was prepared in three models (MOD-I, MOD-II and MOD-III) for this study. The manipulatory capabilities of all the gloves were measured against the ungloved or bare hand, and the results indicated that MOD-III of the new experimental prototype exceeded that of the old and new standard and came closest in performance to the ungloved hand.
GRA

N77-15654# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MEASURE OF FOVEAL SENSITIVITY IN AN EXPANDED FIELD OF VISUAL ATTENTION M.S. Thesis
Jack T. Sakai Jun. 1976 165 p refs
(AD-A026010; GE/EE/76-11) Avail: NTIS HC A08/MF A01 CSCL 05/5

The report measured the effect of a peripheral task on the foveal contrast sensitivity. The foveal sensitivity was measured while subjects were required to simultaneously concentrate on a peripheral task which was placed at eccentricities of 10 degrees, 20 degrees, and 30 degrees along the right horizontal axis. The

peripheral task was a sine-wave grating which was generated on an HP-1205A oscilloscope. The foveal contrast sensitivity was measured for 4 angular orientations using 4 spatial frequencies (3, 6, 10 and 20 cycles per degree) of sine-wave gratings. All threshold measurements were obtained using the staircase method of psychophysical testing. The staircases for each of the 4 orientations were run concurrently by random selections among these orientations. All stimulus presentations were under computer control. Stimulus presentation times were 20, 50, 100, and 500 msec. The results show that with training, a subject's foveal contrast sensitivity was not affected by a peripheral task. GRA

N77-15655# Oceanautics, Inc., Landover, Md.
AN ANALYSIS OF ENVIRONMENTAL AND PERCEPTUAL DETERMINANTS OF DISPLAY LEGIBILITY UNDERWATER
W. S. Vaughn, Jr. and Jerome Williams (Naval Academy) Apr. 1976 59 p refs
(Contract N00014-74-C-0276; NR Proj. 196-134)
(AD-A026035) Avail: NTIS HC A04/MF A01 CSCL 05/8

Mixed gas underwater breathing apparatus and ambient submersibles extend the range of activities that can be accomplished by a diver. Correspondingly, the divers' needs for information transfer via visual displays are increased. Diver displays have not been designed to account for the unusual physical and perceptual effects of undersea viewing. The present project provides a systematic foundation of requirements for the optimization of visual display design for undersea applications. One of the principal classes of visual tasks required of divers is quantitative reading, and a variety of display types support this task: digital counters, round dials, horizontal and vertical tapes, and light emitting diode displays. Display characteristics related to legibility include viewing distance, symbol size, luminance, color and location in the visual field. Optimum values of these characteristics depend on the turbidity and luminance characteristics of the viewing environment, and on the visual-perceptual characteristics of the underwater viewer. Detailed analyses were made of these two sources of determinants of display legibility for a range of conditions typical of undersea operations. Results of the analyses provide general guides for display optimization in undersea viewing environments, and a foundation for experiments needed to more precisely specify display parameter-legibility relationships. GRA

N77-15656# Naval Training Equipment Center, Orlando, Fla. Human Factors Lab.
REQUIREMENTS FOR COLOR IN TELEVISION DISPLAYS Final Report, Sep. 1975 - Jun. 1976
Joseph A. Puig Jun. 1976 25 p refs
(AD-A026747; NAVTRAEQUIPC-TN-50) Avail: NTIS HC A02/MF A01 CSCL 05/5

A review of the literature was made as part of Task 6723-01, Wide-Angle High Resolution Color TV Technique for Training Systems. Forty-one references were consulted, twelve of which described research in applied experimental settings. Subjects in ten of the twelve studies showed some improvement in performance as a result of using color in the displays. The decision as to whether a color or monochrome television system should be used appears to be dependent on the specific application and cost factors. If either type could be produced and maintained for equivalent costs, then there is evidence to suggest that performance with color TV would be as good, and for some applications, better than monochrome TV. GRA

N77-15657# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
A STATE SPACE MODEL FOR SENSORIMOTOR CONTROL AND LEARNING
Marc Raibert Jan. 1976 37 p refs
(Contract N00014-75-C-0643)
(AD-A026960; AI-M-351) Avail: NTIS HC A03/MF A01 CSCL 05/10

The report is the first of a two-part presentation which deals with certain computer controlled manipulator problems. This first part discusses a model which is designed to address problems of motor control, motor learning, adaptation, and sensorimotor integration. The problems are outlined and a solution is given which makes use of a state space memory and a piece-wise linearization of the equations of motion. A forthcoming companion article will present the results of tests performed on an implementation of the model. GRA

N77-15658# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
SPATIAL KNOWLEDGE
Benjamin Kuipers 1 Jun. 1976 52 p refs
(Contract N00014-75-C-0643)
(AD-A026874; AI-M-359) Avail: NTIS HC A04/MF A01 CSCL 05/10

This paper introduces a model of spatial cognition to describe the states of partial knowledge that people have about the spatial structure of large-scale environment. Spatial knowledge has several different representations, each of which captures one aspect of the geography. With knowledge stored in multiple representations, we must examine the procedures for assimilating new information, for solving problems, and for communicating information between representation. Author (GRA)

N77-15659# DARCOM Intern Training Center, Texarkana, Tex.
THE FEASIBILITY OF SHORT INTERVAL TIME ESTIMATION AS A METHODOLOGY TO FORECAST HUMAN PERFORMANCE OF A SPECIFIED TASK Final Report
John E. Phillips Apr. 1976 86 p refs Prepared in cooperation with Texas A and M Univ., Texarkana
(AD-A026757; DARCOM-ITC-02-08-76-010) Avail: NTIS HC A05/MF A01 CSCL 05/10

This paper proposes and initiates the testing of the hypothesis which states: 'An estimate of a short interval of time will indicate one's ability to perform a specified task relative to his ability to perform this same task at other points in time throughout the day'. The investigation includes a survey of previous time estimation research and other related chronobiologic studies. It examines the interval estimation - task performance relationship by correlating two short intervals of time with performance of a letter cancellation task. GRA

N77-15660# DARCOM Intern Training Center, Texarkana, Tex.
AN INITIAL INVESTIGATION OF THE EFFECT OF REPEATED HIGH INTENSITY FLASHES ON MAN'S PERFORMANCE OF A TRACKING TASK Final Report
Martin E. Winkler Mar. 1976 90 p refs Prepared in cooperation with Texas A and M Univ., Texarkana
(AD-A026824; DARCOM-ITC-02-08-76-115) Avail: NTIS A05/MF A01 CSCL 05/5

The paper is a report of research designed to investigate the effect of repeated glare on human performance of a tracking task. The experiment used an EAI 680 computer to create the tracking task as well as to record the experimental data. Subjects were dark-adapted for thirty minutes and then performed the tracking task for a half hour fun period. During the run the subject experienced four flashes from a glare source. A control run, with no dark-adaption or intermittent flashes, was performed by all five subjects. Performance was measured by the time required to reach a predetermined level of error, while a biological factor was measured by the lowest galvanic skin resistance value during the time period prior to reaching the error level. Statistical analysis showed both the flash-time factor and the condition flash-time interaction to be significant at the 95% level of confidence. Graphical analysis showed the subjects' performance to increase with time while operating the tracking task under the glare condition. GRA

N77-15661# DARCOM Intern Training Center, Texarkana, Tex.
GLARE RECOVERY OF A TWO DIMENSIONAL TRACKING TASK WITH RESPECT TO VARIOUS COLORS Final Report

Dennis A. Boyer Apr. 1976 73 p refs
(AD-A026759; DARCOM-ITC-02-08-76-015) Avail: NTIS HC A04/MF A01 CSCL 05/5

The results of research intended to determine the effect of variation in color on a two dimensional tracking task with superimposed glare flashes are described. The EAI 680 Analog Computer was the primary function generator with the EAI 600 Pacer digital computer performing control functions and Data analysis. Tests on five subjects under four colors indicates that the blue filtered light was significantly better than white, red, or orange-red filtered light when a glare was imposed. GRA

N77-15662# California Univ., Los Angeles. Dept. of Computer Science.

BIOCYBERNETIC CONTROL IN MAN-MACHINE INTERACTION Semiannual Technical Report, 1 Jul. 1975 - 31 Jan. 1976

Jacques J. Vidal, M. D. Buck, R. J. Hickman, and R. H. Olch Mar. 1976 99 p refs Sponsored in cooperation with San Diego State Found., Calif.
(Contract N00014-76-C-0185; ARPA Order 3065)
(AD-A026193; UCLA-ENG-7657) Avail: NTIS HC A05/MF A01 CSCL 06/4

A progress report is presented of a project directed toward the evaluation and implementation of man-machine command and control procedures that incorporate neuroelectric signals directly derived from the brain. This document first reports on the current state of the project. A first milestone has been reached: one such man-machine loop has been operating for several months at nearly operational performance levels. In the communication protocol of this 'MASTER-ROBOT' team, the computer robot executes commands encoded in the master's occipital brain waves (as SINGLE OPOCH VISUAL EVOKED RESPONSES). To send a command the master visually selects the corresponding command symbol from a displayed set. Symbol pattern and color have been used in the command alphabet. GRA

N77-15663# California Univ., Los Angeles. Dept. of Computer Science.

BIOCYBERNETIC CONTROL IN MAN-MACHINE INTERACTION Final Technical Report, 1 Jul. 1974 - 30 Jun. 1975

Jacques J. Vidal, M. D. Puck, R. J. Hickman, and R. H. Olch Sep. 1975 82 p
(Contract N00014-69-A-0200-4055; ARPA Order 2816)
(AD-A026194; UCLA-ENG-7654) Avail: NTIS HC A05/MF A01 CSCL 06/4

The research is a continuation of a program aimed at incorporating EEG 'evoked responses' in man-machine communication. A methodology for the single-epoch discrimination of evoked responses has been developed. The approach is compatible with real-time computing. High rates of stimulus identification have been obtained with several types of visual stimuli. GRA

N77-15664# Army Materiel Command, Texarkana, Tex. Intern Training Center.

THE EFFECTS OF DRIVER COMFORT ON VEHICLE SPEED Final Report

Charles H. Berry, Jr. Dec. 1975 39 p refs
(AD-A026348; USAMC-ITC-02-08-76-406) Avail: NTIS HC A03/MF A01 CSCL 05/9

This report describes the results of research intended to determined the correlation between vehicular design and speed driven without the aid of the speedometer. The results from experiments with 21 male subjects indicate a significant difference in the comfortable speeds of 3 test vehicles. The results show that the comfortable speed for drivers is well above the present speed limit of 55 mph. Implied by these results is the need for further research in vehicle design characteristics to coincide the comfortable speed with the speed limits. Author (GRA)

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